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The objective of this study was to identify and describe problems experienced by public school systems in increasing utilization of instructional television (ITV) subsystems. Study effort was focused on systemic resistances: interacting characteristics of the school system's organizational structures and functions, including the ITV subsystem, which prevent or retard increased utilization of ITV. The experiences of school systems in coping with these problems also were examined as a source of information for future strategies of optimizing ITV utilization. In addition to an intensive literature review and consultation with recognized leaders in public education, educational innovation, and ITV research, site visits were made to nine school systems utilizing ITV. Intensive case studies were made at two of these school systems. (Author)

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Volume I

U.S. DEPARTMENT OF HEALTH, EDUCATION & WELFARE
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Washington, D.C.

February 1969

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PREFACE AND ACKNOWLEDGEMENTS

The study described in this report was originally proposed as a broad examination of exemplary utilization of innovative media systems generally. At the request of the Office of Education, the study was focused on instructional television (ITV) in public school systems in order to be most useful to the purposes of the Public Broadcasting Act of 1967. To this same end, because exemplary utilization is an objectively soft term, the objective of the study was targeted on an analysis of systemic resistances in public school systems which prevent, or retard, increased utilization of ITV.

The authors are indebted to the following persons with whom they consulted during the course of the study: Dr. Wilbur Schramm; Dr. Ray C. Carpenter; Dr. Robb Taylor; Dr. Norman Kurland; Dr. Bruce Briddle; Dr. Matthew Miles; Dr. Wesley Meierheury; and Dr. Lawrence Siegals. Their contributions to the study were invaluable; the authors, however, are solely responsible for the contents of this report.

A special debt of gratitude is owed Dr. Jack Lyle who, in addition to preparing one of the two detailed case studies included in the separately bound Volume II of this report, served as a continuing consultant to the authors throughout the study.

During the course of the study, site visits were made to the following school systems (including a few higher educational centers) in which ITV was being utilized. The authors wish to thank all of the personnel--from administrators to students too numerous to list by name here--in these school systems for their contribution to this report. It is a tribute to their dedication to education in general, and to their open objective approach to ITV in particular, that they cooperate fully, in a study they knew to be focusing on problems.

Washington County (Hagerstown), Maryland
Columbia, South Carolina
Nova, Ft. Lauderdale, Florida
West Hartford, Connecticut
Stamford, New York
Compton Junior College, California
Florida Atlantic University, Boca Raton, Florida
Dade County (Miami), Florida
New Trier Township, Illinois

The last two school systems willingly consented to be the subjects of the two detailed case studies contained in Volume II of this report. Therefore, the authors wish to gratefully acknowledge the special contribution to the report made by the administrations of these two school systems, as well as all other personnel with whom they visited during the case studies. Mr. Donald MacCullough, Supervisor for Instructional Radio and Television Production for the Dade County Public Schools, and Mr. Robert Pirsein, ITV Coordinator in New Trier Township, were particularly helpful in many ways; they gave generously of their time and effort to help the researchers collect the data necessary for the case studies.

SUMMARY, CONCLUSIONS AND RECOMMENDATIONS

SUMMARY

The objective of this study was to identify and describe problems experienced by public school systems in increasing utilization of instructional television (ITV) subsystems. Study effort was focused on systemic resistances: interacting characteristics of the school system's organizational structures and functions, including the ITV subsystem, which prevent or retard increased utilization of ITV. The experiences of school systems in coping with these problems also were examined as a source of information for future strategies of optimizing ITV utilization.

In addition to an intensive literature review and consultation with recognized leaders in public education, educational innovation, and ITV research, site visits were made to nine school systems utilizing ITV. Intensive case studies were made at two of these school systems.

CONCLUSIONS

The principal findings of the study were the following:

1. ITV subsystems are being utilized for direct teaching, supplementary teaching, enrichment teaching, and for administrative communications, in various patterns of use in school systems. No consensus among the school systems, or within any given school system, existed regarding the most desirable pattern of use, pedagogically or economically. However, most school systems felt that ITV

utilization for either enrichment or administrative purposes alone, or for both together, was not justified economically; use in either direct or supplementary teaching, or both, was felt to be necessary for most school systems.

2. An adequate--reliable and accurate--index of classroom utilization has not been developed. In most school systems, utilization was equated with broadcast time; all school systems agreed that this was an inadequate index, at best, which overestimated actual classroom utilization.

3. Even with this inflated index, most school systems reported that their utilization rates needed to be higher for them to consider the ITV subsystem to be efficient. The highest utilization rate reported was 17% of class time, which was in the Hagerstown, Washington County, Maryland, school system. Experience is not yet adequate to define the utilization rates that would be pedagogically or economically desirable for any given type of utilization pattern.

4. ITV classroom utilization, as a process independent of production and transmission, has received an inadequate allocation of resources in school systems. More often than not, classroom utilization aids, adequately compensated teacher-training, equipment maintenance, objective classroom program evaluation, and formal utilization feedback systems if existent were insufficiently programmed and supported in the school systems to have had a significant impact on ITV utilization rates.

5. ITV utilization was lower than possible in most school systems because of the lack of a large enough quantity

of high quality software. Most of the in-use programs were of uncertain objective quality because of the lack of formal, continuing, student-performance classroom evaluation procedures. Whatever their objective quality, students and teachers subjectively felt that most existing programs were of poor quality. Undoubtedly, many were using commercial TV as a standard, but this single factor cannot account for the wide-spread impression of generally low ITV program quality.

6. Poor program quality was found to be related to several factors. Basically, the "cottage industry" approach to ITV program production, characteristic of many of the school systems visited, in which it is envisioned that most of the ITV programs to be used by the system would be produced within the system, has been a failure to date.

a. Production costs for local program production have been the single largest ITV operating budget line item. Even then, the resources have been inadequate for producing high quality programs because the resources have been spread too thinly over too many programs.

b. The relief from high local production costs that was anticipated through "program-sharing" among school systems has not occurred; program-sharing has run afoul of existing copyright laws. These contain a tangle of restrictions related to use permission and fees. Two key issues are: the residual rights of teachers involved in producing a program; the use permission and fee paid for a proprietary "clip" used in a program not being applicable for the program's use by a "borrowing" school system.

c. Attempts to insure high classroom utilization of locally produced programs through "involvement" of classroom teachers in the production process have been counter-productive in terms of both program quality and teacher acceptance. Most classroom teachers have neither the desire nor talent to be so involved; there seems to be little positive transfer from the ability of some teachers to recognize a "good" program to an ability and willingness to produce one.

d. Agreement on program specifications is difficult to achieve among teachers themselves; teacher views frequently clash with professional production views. The inevitable compromises in content and pedagogical technique necessary in such situations frequently results in a program judged to be of poor quality even by the teachers who were involved. The combination of frustration in "involvement" and dissatisfaction with the end-product clearly militates against high utilization, particularly when an objective evaluation system, based on student performance, is not available.

7. ITV utilization has been adversely affected in most school systems by logistical problems associated with the centralized nature of ITV subsystem production, transmission and maintenance and the decentralized nature of program utilization.

a. Centralized program transmission for direct and supplementary teaching purposes, particularly in decentralized school systems, has created severe scheduling problems for school principals. The problem becomes more severe as the number and size of the schools in the system becomes larger, and when only a few transmission channels are available; with an equal number of channels, the problem seems more severe at the secondary level than at the elementary level.

b. Few school systems had adequate back-up equipment of any type, most schools had an inadequate number of outlets and receivers, preventive maintenance procedures rarely were in effect, and emergency maintenance services were unable to respond quickly enough to prevent "lost" instruction in the classroom.

8. Most school principals and classroom teachers did not seem to object to ITV as a medium per se, but attributed their reluctance to make greater use of ITV primarily to one or more of the following factors: poor program quality; equipment unreliability; scheduling difficulties; lack of coordination of program content with classroom instructional aids and other curriculum materials; lack of adequate "release" time for preparation; the apparent conflict of the pedagogical "lecture" technique of most ITV presentations with general educational trends toward decentralized, individualized, self-paced, modular instruction.

9. ITV, when used in system-wide direct and supplementary teaching, is perceived by many principals and classroom teachers to be an invasion of the autonomy and status which they traditionally associate with their roles in the

educational organization. In one way or another, ITV is viewed by many as a threat to their professionalism and/or career. These perceptions tend to be strongest: in school systems where ITV operating costs have been budgeted categorically with instructional salaries; at the secondary level more than at the elementary level (specialist vs. generalist dimension); in the richer (comparatively) school systems (in which more highly credentialed specialists are found) than in the poorer school systems.

10. Utilization problems do not occur in isolation in school systems; they are all present and interacting in systemic fashion to some extent within each school system utilizing ITV, although a given problem may be more salient in one place than in another. All school systems reported that the problems accompanying the introduction and utilization of ITV have had a salutory effect; ITV has stimulated re-examination of organizational, curricular, and pedagogical policies and procedures, a process which each school system felt has been most beneficial. The re-examinations, however, are too often responses to problems frequently attributable to inadequate initial planning.

RECOMMENDATIONS

The following recommendations were made on the basis of this study.

1. Achieving optimal utilization of ITV subsystems in public school systems should be recognized by all concerned as the development phase in a systems approach involving research, development and operational phases.

2. Ultimate economic pay-off of ITV should be expected during the operational phase, but not necessarily during the development phase. Development costs should be considered as an investment to be amortized during the subsequent operational phase, either through a reduced unit cost of instruction per pupil without sacrifice of quality, or through increased quality of pupil learning at an equal, or acceptable increment in, unit cost.

3. ITV should not be considered _a priori_ as suitable for all school systems, or for all curricular areas at all levels within a given school system. The decision to install and utilize an ITV subsystem should be made only in the context of a searching analysis of the school system's educational goals and alternative educational strategies to achieve these goals, with ITV being considered a component subsystem that can be included in various patterns of use, in any one of several strategies to achieve defined, targeted instructional objectives.

4. School systems should be encouraged to shift their internal allocation of resources priority from ITV program production to ITV program utilization. New cooperative efforts among school systems for program production should be explored and encouraged (see 6a. below).

5. ITV should be introduced into a school system only after a development phase has been planned and programmed with adequate resources through time. New "change-agent" mechanisms, centered at the district superintendent organizational level, but with a net to each school in the system, should be considered to facilitate both the adoption

and utilization process during development. This sort of mechanism would oversee collection of empirical evidence during development which would "feed-back" into accomplishment of the following tasks:

a. Conducting coordinated in-service training for ITV subsystem staff, classroom teachers, and paraprofessionals, in which a "team" approach to ITV teaching is stressed, with emphasis on freeing the classroom teacher for more, individualized, personal interaction with students.

b. Establishing formal quality-control systems for evaluating classroom-utilization, involving both objective student-learning and teacher-instruction criteria, for use in program validation.

c. Providing adequate physical reception facilities and equipment, and back-up equipment and procedures for preventative, as well as emergency, maintenance services.

d. Projecting deliberately paced time-schedules for introduction of ITV programs into specific courses, curricular areas, and grade levels commensurate with the development resources available. Across-the-board introduction of ITV should be recognized as short-sighted and counter-productive, economically and pedagogically, in the long-run.

6. The Federal Government should be a catalyst for increasing ITV utilization by providing fiscal aid for ITV only to those school systems which conduct the system analysis and incorporate the systems approach to utilization recommended above. Beyond that, the Federal Government can

stimulate proper ITV utilization best by focusing its efforts on improving program quality, distribution technological development, and future manpower training.

a. To improve program quality, consideration should be given to: establishment of regional cooperative program production centers, pooling local talent and resources in organizations structurally independent, but functionally coordinated with, participating school systems; stimulation of the private sector to produce ITV programs, much in the manner of textbooks and other instructional materials; modification of existing copyright laws to facilitate "program-sharing."

b. To ease ITV scheduling difficulties in direct and supplementary teaching, stimulate technological development of lower cost videotape recorders and videotape.

c. To create a cadre of teachers trained to utilize ITV to its potential in the future: support the establishment of ITV curriculum concentrations--from production through utilization--in selected teachers colleges and university and college education schools and departments; support establishment of a general course-offering for all education majors in ITV utilization in all teacher preparation institutions.

I

BACKGROUND, PURPOSE AND APPROACH

> "Innovation in the school is like innovation in any complex environment. Bring a single new species of insect into a forest and you may remake a landscape; plant a new crop and you may alter the economy of a nation. . . . As with other innovations, the success or failure of [an educational] program seems to depend in large measure on its appropriateness to the original environment and on the skillful identification and handling of the changes which the innovation touches off."*

BACKGROUND

The last decade has seen widespread adoption of innovative media systems in United States education. This proliferation has occurred at all educational levels, elementary through higher, in both public and private institutions. All types of media systems have been involved in this major development, ranging from new uses of radio to computer assisted instruction systems. The Federal Government, through funds provided by the Office of Education, Department of Health, Education and Welfare, has been a principal stimulus for this development.

New media are being introduced into United States education at a time when public school systems are under pressure to provide a higher-quality education for an increasing enrollment of students at the lowest possible cost. Within this context, developments in media technology are viewed at once as forcing functions for change in educational content and instruction, and vehicles for accomplishing this change economically (Wigren, 1967).

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* Fund for the Advancement of Education. Four case studies of programmed instruction. New York: June, 1964.

It is generally recognized that, with a few exceptions, the potential economic benefits that might be realized with the new media depend upon their optimal utilization within a school system (Biddle and Rossi, 1966). And it is further generally recognized that optimal utilization depends on acceptance and support of the media system by educational personnel at all levels within the school system--particularly, of course, by classroom teachers who, in the final analysis, are in ultimate control of utilization (Miller, 1967a).

Resistance to innovation in organizational systems in general has been analyzed extensively (e.g., Bennis, 1962), as has resistance to innovations in the educational system in particular (e.g., Miles, 1954; Miller, 1967). However, utilization of an innovation, once adopted by the educational system, rarely has been evaluated or analyzed (Geis, 1968). There is no reason to doubt that evaluation and analysis may be as important, if not more important, to system utilization of adopted innovations as it is to the initial adoption of that innovation (Lindman, 1965). From one viewpoint, adoption is not considered complete until it is being rather fully utilized (Eichholz and Rogers, 1964).

PURPOSE

The objective of this study was to identify and describe factors related to classroom utilization of new media in educational systems. With the passage of the Public Broadcasting Act of 1967, and given the study resources available, it was decided after a request of the Office of Education to focus on utilization of instructional television (ITV) subsystems in public school systems, elementary and secondary.

More specifically, the study examined _systemic_ _resistances_: interacting characteristics of the school system's organizational structures and functions, including the ITV subsystem, which prevent or retard increased utilization of ITV.

This report has several aims. The first is to describe the typical ways in which ITV is being utilized in a selected number of school systems. The second is to identify and analyze common and unique systemic resistances to ITV utilization which have occurred in these school systems. These two aims are instrumental to the third and fourth aims.

Because there has not been enough accumulated experience with ITV utilization to adduce firm guidelines, the third aim is to present the utilization experiences above in such a way that other school systems perusing them may gain insights which may be useful to them if they are planning to adopt ITV in the near future. The fourth aim is to suggest specific directions for future research and development effort in ITV which may help ameliorate, or even avoid, a number of utilization problems identified.

APPROACH

The study plan originally included a review of the literature and four (4) detailed case studies. However, it soon became apparent that the literature did not contain an adequate amount of empirical information about actual operational utilization of ITV in public school systems. On the advice of the study consultants, and with the concurrence of the Office of Education, it was decided to broaden the actuarial information base of the study. This was done by conducting brief site visits to a total of nine (9) school systems, subsequently preparing detailed case studies on just two (2) of the systems.

The school systems visited differed markedly from one another along several dimensions--*e.g.*, size, organization, composition of student and community constituency, expenditures per pupil--but obviously they cannot be considered a representative sample of school systems using ITV in the United States. The approach of the study was not development of a quantitative statistical picture of selected ITV utilization parameters; in a real sense, ITV utilization is too recent and too fluid for such an approach to reveal very much about the process of utilization at the present time. Rather, the approach emphasized comparative analysis of the entire utilization process among selected school systems known to differ in important characteristics; common problems identified under such a range of conditions can be accepted as pervasive with some confidence.

The study proceeded in several well-defined phases. Initially, a conceptualization of the organizational structure of the school system relevant to ITV utilization was developed on the basis of a review of the literature and discussions with the study consultants (Chapter II). This formulation was revised from time to time throughout the study as information was collected on the site visits.

Site visits were then made to the nine school systems, selected on the basis of information contained in the Office of Education PACESETTERS IN INNOVATION series and the recommendations of study consultants and Office of Education personnel. Two-to-three (2-3) day visits were made to each system for the purposes of operational data collection and interviews with key personnel in the system.

The public school systems visited were:

Washington County (Hagerstown), Maryland
Columbia, South Carolina
NOVA, Ft. Lauderdale, Florida
West Hartford, Connecticut
Stamford, New York
Dade County (Miami), Florida
New Trier Township, Illinois

In addition, site visits were made to Florida Atlantic University (Boca Raton), Florida and Compton Junior College because of the potential for public school systems of the innovative approach to utilization of new media at these two institutions. Briefer, observational visits were made to a number of other systems for specific, focused purposes (rather than a review of the entire utilization process). These were: public school systems in Los Alamos, New Mexico, Beverly Hills, California; and Evanston, Illinois; Oakland Community College, Bloomfield Hills, Michigan; Stevens College, Missouri; Dade County Community College, Florida; College of the City of San Francisco, California; the Oak Leaf and McNaulty schools in Pittsburgh, Pennsylvania.

The Dade County (Miami), Florida and the New Trier Township, Illinois school systems were selected for intensive case studies. The willingness of the administrations of these two systems to cooperate in the study was not unimportant to their selection. More importantly, however, from an ITV utilization process viewpoint, they differed significantly on several criteria.

Dade County emphasized direct television teaching, while New Trier emphasized supplementary and enrichment television teaching; Dade County is administratively centralized, but moving more to decentralization, while New Trier is decentralized, but tending toward some centralization; the Dade County district is largely urban (Miami), the community rather socially heterogeneous, and the school system not ranking at the top of expenditure-per-pupil ladder, while New Trier is largely suburban, the community rather homogeneous socially, with one of the highest socio-economic levels in the country, and the school system considered to be rather well-financed on an expenditure-per-pupil basis. (The two case studies are bound separately as Volume II of this report.)

On the basis of the site visits and case studies, typical ITV utilization formats were described (Chapter III) and common and unique problems of these formats identified and analyzed (Chapter IV). Major conclusions and recommendations were then synthesized (Chapter V). A glossary of terms used in the report and an annotated reference bibliography are presented as Appendices (A and B., respectively).

The content orientation of the study, as indicated earlier, was toward the utilization process. Research has shown that, under proper conditions, students can learn as well, or better, in a number of different subjects by ITV as by traditional classroom methods. This proposition was accepted as given and this study did not examine objective learning results being achieved through ITV utilization. Rather, the approach was much more basic. Learning cannot occur through ITV if it is not being utilized and this study was concerned with conditions which help or hinder utilization. To the extent that objective evidence regarding non-learning by students could be cited as a reason for non-utilization of ITV, then learning affectiveness was covered in the study--this was rarely the case.

Finally, as suggested by the term systemic resistances, the study orientation clearly reflected a systems approach conceptually. ITV was viewed as more than just another audiovisual aid, such as a new type blackboard designed for magnetic displays, whose introduction causes little more than a ripple outside of the classroom. ITV was viewed as a major innovation in pedagogical technique, constituting one subsystem of several within the school system, and therefore necessarily requiring examination in terms of its "fit", structurally and functionally, with other subsystems as they all pursue and contribute to the system's educational goals.

The study, and this report, are only a beginning; the resources were too modest, the scope too focused for this effort to have resulted in any sort of definitive analysis of the ITV utilization process. Much additional research, including a continuing evaluation effort of in-the-field utilization, is required before the ITV utilization process is well enough understood to allow ITV to realize the full educational potential which is its promise.

II

THE SCHOOL SYSTEM CONTEXT

SCHOOL DISTRICTS AS OPEN SYSTEMS

More often than not, innovations are introduced into American public school systems without adequate consideration having been given to the amount of planning, effort, and follow-through necessary to make them take and work. The individual innovation is treated as though it were something self-contained and capable of being put in place without disturbing the rest of the system. But school systems, like all social systems, are integrated structures, where every element is somehow functionally related to every other, so that changing one may sometimes mean changing all. Under such circumstances, relatively minor modifications may fail to take, because there are simply not enough resources available to follow through with all the secondary and tertiary changes that have to be made. Or such minor modifications may take too well, threatening to disrupt basic processes and thereby provoking other elements of the system into defensive counteraction. In short, systems tend to act as wholes, and changing one part often becomes a change of the whole.

BASIC SYSTEM CONCEPTS

A system is a dynamic set of interdependent elements, functionally integrated so as to produce some characteristic total effect. Atoms, machines, animals, and societies are all systems, each either closed, like the first two, or open, like the last two, dependent upon whether or not it is organized to procure from its environment the energies needed to keep it going. Closed systems are characterized by entropy--a continually increasing disorganization, which in open systems is counterbalanced by negative entropy--the power to organize, yielding a *steady state* in which *outputs*, or losses to the system, are balanced by *inputs*, or gains from its environment. Moreover, open systems have the power to reestablish steady *state* after a disturbance, or--what is the same thing said in another way--to maintain *steady state* over a range of varying inputs. In short, they are *self-regulating* and exhibit *equifinality*, the capacity to achieve identical results from different initial conditions.

Most systems form parts of supersystems and are themselves composed of subsystems; the use of the terms systems and subsystems is arbitrary, depending upon the frame of reference used. Thus, school districts are supersystems to schools and subsystems to communities. Each subsystem has a function to perform, and its consistent, coordinated interaction with all of the others leads to the *functional unity* of the system as a whole. There is a progressive *segregation* of subsystems into a single, hierarchical order, and a progressive *mechanization* of system processes, leading in particular to the development of *feedback*, the ability of the system to adjust its own future conduct on the basis of its past experience.

Sometimes "normal" change and innovation within systems are confused. The former is built into the very structure of open systems, which are "contoured" in time as well as in space. This is the basis of their adaptability, for in the definition of each system element there is a tolerance, within which change may take place freely and independently in response to the changing characteristics of the milieu. To make changes within tolerance is not, therefore, to innovate, for the changes so made are not changes from the point of view of the system, which is in no way disturbed or modified.

The degree of tolerance in any social system varies a great deal from one subsystem to another. Particular parts of it may be looser or tighter than others, those with the highest levels of tolerance being the most amenable to change. There is a selective advantage in a system having this kind of differentiation, with the tighter parts carrying continuity, and the looser facilitating adaptation.

SCHOOL SYSTEM ISOLATION

The more fundamental structural parts of systems tend to be less exposed to outside influences, and such is apparently the case where the American public school system is concerned, for it has essentially the same social structure everywhere in the United States, and this sameness has been true for generations. This structural constancy has been facilitated by the weakness of the structural relationships between public school systems and the rest of the community, a weakness which is, in part, formal and deliberate--the expression of a fundamental American value in local autonomy. There are structural relationships upwards to the state and the nation, and these relationships are growing, but they are still weak and circumscribed. Public school systems tend to be autonomous even at the local level, frequently being independent of civic government and possessing their own tax bases.

This localism is not as categorical a characteristic as many have thought. Wayland (1963), for example, has pointed out the presence of an implicit "national system" in American public education--a result of teacher and student mobility, the interrelationship of schools of education, the national examination systems, and a host of other factors. The very sameness of social structure to be found everywhere in the public school systems of the United States is an index to the existence of such a national system. But that system is cultural, rather than social--more a matter of standard practice than of centralized power. In terms of power, every school system tends to isolation.

The relative isolation of the public school system is due to more than local autonomy value. It derives, at least in part, from the fact that public school systems have little immediate bargaining power in community life, for they deal with future wealth, broadly defined, which is difficult to assess in terms of present power, and with children, who are relatively powerless, and the schools do not directly contribute to the production of the immediate wealth on which they are dependent for their operation.

American public school systems are not simple isolated from the rest of the community; they traditionally have been isolated from one another. There is little competition between them. They are, as Carlson (1965) says, "domesticated organizations," unable to select their own clients, which clients are designated by law and required to accept the service. Such organizations neither compete nor struggle to survive; their existence is guaranteed, and this tends to divorce them from the necessity of adapting themselves to a changing environment through structural modification.

The School Board Linkage

The structural isolation of the American public school system is not complete. It receives inputs from the community through various linkages, the most significant of which is that between the superintendent and the school board. However, even this most critical of all communication channels between the school and the community is structurally weak, because it is inherently ambiguous. For although the board is legally dominant, the superintendent wields the powers of professional knowledge and immediate administrative control. On the other hand, his ascendency is not clear, for if he sits with the board as executive secretary, he is nevertheless not a member of the board, which can fire him or overrule him at will. He is, therefore, a client of the board in terms both of financial and of social support, just as the board is his client in its need of professional and administrative guidance.

In the end it is not certain who is really running the system, so that, since both the board and the superintendent feel responsible, they tend to become rivals in management. When the two parties are competent, the expression of this rivalry is muted, but the ambiguity remains, and it reaches outward to characterize the relationship of the board to all the staff roles, which, for most practical purposes, are known to the board primarily through the mediation of the superintendent.

The effect of such an ambiguity tends to be isolating. It works like a filter to eliminate direct administrative ingress from the community. Whatever comes in from the outside comes through the "rectifying" interpretation of the superintendent, who "negotiates" meanings with the school board and thereby screens the rest of the system. The function of the school board typically is reduced to certain legislative and judicial actions--the statement of general policies, the overall question of finances, the review of qualifications and disputes. In many systems, the only direct executive function it fulfills is the hiring and firing of the superintendent himself (see Goldhammer, 1965).

Other Linkages To The Outside

To one degree or another, every staff role in the American public school system is linked to the outside independently of the board and the superintendent, but in terms of influencing the internal structure of the school system, such relationships are usually indirect and often trivial. For example, all staff members live outside the system and therefore carry into it the influences of other roles and values--political preferences, religious convictions, training in particular schools of education, etc. But these are individual influences, bearing upon them as teachers or administrators in general, not as the role occupants of particular systems. Only the superintendent among the major staff roles seeks to take a leading part in public life (see Goldhammer, Suttle, Aldridge, and Becker, 1967), and he does so to influence the community on behalf of the school system, not to bring community influence into school affairs. In fact, one of his principal concerns is public relations and the buffering of his district from outside interference.

The principal, of course, maintains relationships with the neighborhoods surrounding his school in order to keep on good terms with property owners, to dispose of family-school squabbles before they reach the public level of the board, and to control his own students. But in doing so he deals with no collective institution more powerful than the P.T.A.; most of his contacts are with private citizens and individual functionaries. And community relationships are even more restricted in the case of the teachers, who regard them with anxiety and avoid them wherever possible (see Pellegrin, 1965). Indeed, the teachers' contacts are more often than not limited to the parents of their own students. The students themselves belong to both worlds--the school and the community--but they have trouble making the linkage even within their own personalities and tend instead to segregate and compartmentalize the school from the community.

The traditional isolation of the school system has begun to break down within the last decade. More and more, the community--students, parents, government, special interest groups--is bringing pressure to bear from the outside, for change inside. However, while the winds of change are blowing, the picture of isolation presented here is still characteristic of most school systems in the United States.

SOCIAL STRUCTURE IN THE AMERICAN PUBLIC SCHOOL SYSTEM

Thus, the social structure of the American public school system has been kept in a kind of sanctuary, protected from the need for basic change by distantiation from the stresses and strains of community life. This fact has given stability to American public education, despite the variety and variability of its processes. But it has also masked the contradictions internal to the structure itself by making it possible for conflicting roles to find--in the absence of outside goads and disturbances--some sort of *modus vivendi*.

In theory, the social structure of the American public school system follows the simplest kind of hierarchical order, with the superintendent as decision-maker at the apex of a pyramid whose base is the students being processed. In fact, however, much of the most critical decision-making takes place in the classroom. This is because education has not yet been rationalized; instruction is still irreducible to routine; the final determination as to what and how to teach still is made in the presence of the student himself by a teacher intuitively adjusting himself to the student's nature through immediate interaction. The situation is similar to that in medicine, where the individual physician acting in the presence of his patient still makes the critical decisions, while the hospital director confines himself to overall policy and routine administration. However, being "run from the bottom" is easier in medicine than in education, where few teachers are as professionally qualified as their administrators, and where the former are neither chosen nor rewarded by their clients, but by "the system". In short, there is a role conflict built into the American public school system--a conflict that has managed to survive there unresolved, because system structure has been kept undisturbed in its sanctuary.

The Superintendent Role

The superintendent's role is best understood by starting with a situation where there is no superintendent, but only a small community and a single teacher. In such a situation, the entire educational program is contained in the individual classroom, and the relationship between the collected families and the lone instructor is directly negotiable. However, when the number of families increases, necessitating a large number of teachers, intermediation becomes necessary, with someone to speak for the teachers and someone to speak for the families--the superintendent (or, earlier, the principal) on the one side and the board of education on the other.

One might conceive of the earliest administrator as a master teacher, his small school being simply one large classroom, divided into sections, each under the immediate control of a teaching assistant, but this conception of things rapidly becomes inadequate as the number and scatter of student groups increases, until the top administrator is no longer in direct contact with either students or teachers. At that point, it is not physically possible for him to know what is taking place in all classrooms, let alone of specifying in detail what should take place there. The best he can do is to set up educational objectives, train teachers in ways to reach those objectives, procure and allocate resources to such an end, and sanction relevant teacher behavior through his control of the assignment and rewarding of personnel.

However, as the district expands, this "best" the superintendent can do becomes very important indeed. The entire educational program is no longer contained in each and every classroom. Role differentiation begins to take place within the province of the teacher--not to change the teacher's role vis-a-vis the other roles of the system, but to subdivide it more and more into subject matter areas, grade levels, and teaching specialties. Through his control of objectives, training, allocation, personnel, and organization, the superintendent is able to take charge of the definition, manipulation, and coordination of these specialties. It is he who--following the general policies of the board--stipulates the educational program.

The Principal Role

The superintendent role tends to remain remote, not only from the classroom, but from the school. Though he controls the program for the district, he cannot himself specify in detail how it is to be implemented, or even review very closely whatever implementation is made. For these functions he is dependent upon his principals and teachers.

The principal is usually in control of a school--that is, of a single building or of a closely grouped set of buildings--and he is in a physical position therefore to exercise some degree of direct supervision over students, teachers, and classroom activities. However, except in very small schools, his subordinates are so numerous and his administrative duties so time consuming that he cannot himself undertake the decision-making for specific learning situations. He enters the individual classroom only rarely, and then with considerable circumspection. The principal tends to confine the bulk of his attentions to interclassroom affairs.

However, interclassroom affairs have come to be very important. They include the overall discipline of students, the assignment of both students and teachers, the relative evaluation of teachers, the specific allocation of facilities and resources, etc.--things which are brought together primarily through determination and management of the school's schedule. In fact, it is through his determination of that schedule that the principal establishes and implements the superintendent's program. The superintendent is therefore dependent upon the principal for his own success as an administrator and an educator, just as the principal is dependent upon him for resources.

The Teacher Role

The teacher is the only staff member primarily engaged directly in education, the process for the sake of which the school system functions. Working within the specific limitations of the superintendent's program and the principal's schedule, it is he who directly assesses individual student needs and chooses the instructional methods and subject matter interpretations to be applied in any given learning instance. Thus, though the decisions he can make are firmly bounded, he is the critical decision-maker in the public school system's educational processes (see Goldhammer, 1965; Pellegrin, 1966). In the final analysis, therefore, his is the role which makes both the program and the schedule work. This is particularly true in that the teacher does not simply choose between alternatives specified by his superiors, but makes decisions in those areas of educational practice which have not been rationalized at all. In short, he exercises a truly executive function, so that both the superintendent and the principal depend upon him for the ultimate realization of their own plans, just as he depends upon them for approval, assistance, defense, and resources.

The Student Role

While the student is the material to be processed, he is not something passive, like the subassembly on a factory production line. Educating him is an interaction, and the teacher's achievement is as dependent upon the student's cooperation as the student's achievement is upon the cooperation of the teacher. This interdependence creates difficulties in the American public school system, where, because they are compelled to participate, some students are countermotivated.

THE STATUS STRUCTURE

The relationships among the various roles of the school system are in part status relationships. Role is the behavior proper to an individual in some particular context of interaction; status is its central core and is composed of basic behavior patterns which serve to indicate the relative social positions of the roles concerned. For example, higher status is signified by acting dominantly.

Dominance

As was mentioned earlier, the American public school system is organized hierarchically, with the order of dominance running down from the superintendent through the principal and teacher to the student. Each role, however, also has its own measure of autonomy. Within the limits of the superintendent's program, for example, the principal controls the schedule of his school, as within the limitations of that schedule, the teacher contols his own classroom. These autonomies tend to be taken as indices of vocational and personal worth, and they are, therefore, difficult to bypass or eliminate, for infringements upon them tend to depress status--not, perhaps, by subjecting an individual to new masters, but by making him more subordinate to the old ones and relatively subordinate to those who were once his peers.

This is where the school system and individual personality systems come together. However justified an extension of dominance may seem to be, it is likely to meet resistance, because it undermines the ability of personality systems to satisfy their own fundamental needs for social-and-self-respect.

Competition

However, these subordinate autonomies do not exist simply to accommodate the individual. Sometimes they are justified in terms of the system in that certain types of decision-making are better decentralized, but almost always they represent a kind of consideration granted by superiors to those of their subordinates, upon whom the superiors depend for the actualization of their plans and the realization of their goals. They indicate the presence of a second kind of status--the division of labor, which operates positively in a quasi-symbiotic way to make differentiated and specialized interests interdependent, and negatively, to create competition.

Ordinarily, there is little competition between the levels of the American public school system. The student does not normally meddle in the affairs of the teacher, the teacher in those of the principal, or the principal in those of the superintendent. More often than not each role acknowledges realistically both its downward and its upward dependencies, respecting the autonomies, or spheres of interest, proper to each level (see Pellegrin, 1966; 1966a). Should a role, on the contrary, invade some such sphere of interest, it would immediately find itself under reciprocal challenge. The officious teacher is harassed by his students, the meddlesome principal by his teachers. (See Erickson, 1967, for the reluctance of principals to invade the autonomy of teachers.)

But if roles up and down the hierarchy tend to support one another, those that cut across it at the same level tend to be competitive. In the case of principals, this competitiveness is muted by physical distance, in that of students by a relative indifference to the scholastic goals involved. Teachers, on the other hand, are thrown together in the same schools and in pursuit of the same vocational aims, and since few of them are genuinely dependent upon one another, competition is something they have to struggle to avoid.

And they do struggle to avoid it. Studies have indicated that teachers do not, for the most part, concern themselves with one another's affairs (see Campbell, 1968; Chesler, _et al_, 1963). Instead, they withdraw from one another, each trying to get along as much as possible on his own resources, without owing or risking anything--somewhat like the traditional peasant farmer, who has little to gain from competition worth the risk of his land, which gives him independence and dignity. The teacher's "land" is his autonomy, the control of his own classroom. To engage in competition would be to risk that autonomy or, at the most, a rise into administration, something only a minority of teachers seem to be interested in.

Ingrouping

This _distantiation_ from social intercourse within the context of school affairs isolates classrooms from one another, as schools are isolated from one another by physical distance. In fact, "isolationism" is a general characteristic of public school system structure. (See, for example, the discussion by Miles, 1967.) The superintendent does not identify with his principals, nor they with him. Each forms an ingroup with his own staff, and these ingroups entrench themselves somewhat like feudal bastions here and there about the district. The teachers are not included in such ingroups. Each of them distantiates himself from all other staff members in order to better defend his autonomy, and this isolationism is reinforced by the physical isolation of the classroom itself. Even the students are slow to ingroup in terms of the system's processes; rather, they draw together in peer groups that cross-cut, and sometimes function in opposition to, school structures. In short, ingrouping, which is a third dimension in social status, is very weakly developed in the American public school system. Of course, the absence of strong ingroups forestalls the development of factionalism, with its conflicts and instability, but it also inhibits communication and frustrates the growth of larger forms of educational enterprise.

Summary View - Status Structure

In summary, the only well developed linkages in the status structure of the American public school system are hierarchical, so that all the important processess--administration, education, and socialization--take place vertically. But even this vertical flow is impeded by the semi-autonomy of each of the successive levels. Defending those autonomies means distantiating from other roles--that is, avoiding groups, dependencies, and involvements of all kinds--so that subordinates hesitate to communicate upwards for fear of inviting superordinates to meddle in their affairs, while peers have no more than a casual influence upon one another, leaving lateral processes without a basis in the system.

This picture of the American public school system is now itself undergoing change. For the first time, the status structure of the public schools is being brought under intensive examination. School life is beginning to have a greater influence in the community, partically through the intellectualization of organizational activities, both in government and in business, but also through the general intellectualization of the citizenry. Thus, education as an institution is moving upwards in status, and there is much jockeying going on for the control of its structures and processes.

Public school innovation in this decade is being focused primarily upon organization, as well as curriculum and methodology, which got started earlier. There is a heavy effort within the teacher's role to develop lateral communication through team teaching, while feedback is being carried out on a new basis by both teachers and students, who have begun to express their autonomies collectively.

Meanwhile, school system management is attempting to break through the teacher's autonomy by programming the educational process and modifying the teacher's role. One index of the times lies in what is happening to that role, which is now under attack from all sides, ostensibly because it is inadequate to the task, but surely in part, at least, because it is in ultimate control of the educational process, and is therefore a source of power today, when education is being regarded more and more as the key element in the control of sociocultural change.

SYSTEM PROCESSES

The Administrative Process

Process is ordered systemic change directed at the achievement of some goal. It is carried by structure, which gives it form and provides the tolerances which make movement and variety possible. The administrative process is an elaboration of the earlier relationship between a group of parents and a single teacher. Because the teacher's status is low, the relationship is largely unidirectional; nevertheless, it flows from top to bottom with ease only so long as it does not impose upon the principal's or the teacher's autonomy. For want of adequate linkages, little administrative communication takes place laterally: whatever passes formally from peer to peer must first rise to a higher administrative level and then descend again--something which does not happen often, since occupants of the lower roles are reluctant to communicate upwards.

The Socialization Process

In the elementary school, socialization takes place largely within the individual classroom and is merged with the educational process, but much of the socialization in secondary schools is now conducted through the activities program, which bypasses the classroom, enlarging the direct relationship between the principal and the student body. Because it does not deal directly with academic affairs and is not, therefore, limited by teacher autonomy, the activities program is free from some of the restrictions that beset the larger administrative process. It is a new and fluid kind of school system behavior, emphasizing lateral, as well as vertical, linkages.

Part of its aim has been to encourage student responsibility, so that it has led to a degree of autonomy and motivation for students unknown in the classroom. Thus, the activities program has broken through traditional barriers. It has increased the participation of students in school affairs and has given them a real opportunity to study and practice a variety of forms of social involvement. However, at the same time, it has brought the socialization process into conflict with education, by creating priority problems in scheduling and the allocation of resources.

Principals, whose direction of student activities is not directly contingent upon the cooperation of teachers, have been inclined to emphasize those activities at the expense of academic affairs, to draft teachers for work there without admitting them to control, and to introduce the newly created student autonomies into the classroom in competition with the autonomy of the teacher.

The Educational Process

The word "teacher" carries the connotation of personal contact with the student. (Textbook writers, for example, are not usually called teachers.) Such personal contact permits the teacher to observe the student during the learning process and to give him continual feedback for the improvement of his performance. This kind of running criticism cannot as yet be completely done "objectively," because all the behavioral systems under observation are too complex and too little understood for rapid and accurate prediction. Thus, the process is still largely dependent upon the teacher's education and experience, guided by the feedback from constant teacher-student interaction. Until some more efficient mechanism is developed, therefore, the classroom teacher will continue to be utilized and be given some freedom to make necessary instructional decisions. It is this fact that has preserved the autonomy of the public school teacher, for the educational administrator could get the results he desired in no other way.

As things stand, then, the public school teacher still controls the educational process, which takes place largely in his own classroom and within the teacher-student linkage. So long as he does not violate the district program or the school schedule, he may do just about as he pleases.

INNOVATION

These elements of status structure and system process profoundly influence the introduction of innovations into a public school district. For example, changes may occur at any point, but to become characteristic of the system as a whole, they must rise to the superintendent's level and re-descend through the standard administrative process.

The Superintendent As Innovator

It is more or less generally recognized that the superintendent is the key figure in public school system innovation. (See Brickell, 1961[*]; Johnson, Carnie, and Lawrence, 1960; Miles, 1963; Carlson, 1965, 1967; Pellegrin, 1966.) This is in part due to his priority before the board and in part to his focal position with respect to pressures and influences coming from the outside, but it is above all due to his status at the apex of the administrative hierarchy and his recognized control of the district program. He alone has the authority to order or forbid change anywhere in the system, so that, if change takes place, it does so with his implicit approval or by default of the exercise of his authority.

Moreover, removed as he is from the education and socialization processes, the superintendent is more than ordinarily motivated to effect change. In order to exercise a conspicuous influence, he must break into school and classroom routine, setting new targets, initiating programs, and re-allocating resources. In fact, insofar as the American public school system can be said to have a change agent, the superintendent is that agent, for only he has the staff resources to keep in full contact with educational trends, to investigate change proposals, to carry on studies and experiments, and to revise the district program.

The superintendent controls the reserves of the system and manages those of its contacts with outside sources of financial aid--the state and federal governments, foundations, etc.--which underwrite school system change. (See, for example, Bessent and Moore, 1967.) Without his active support, any very far reaching innovative idea will die for lack of means. Finally, it is he through whom the board and the public exercise their legal power to force change. As Brickell (1961) points out, parents, citizen groups, and boards of education seldom play much of a role in school system innovation, but their "influence is decisive when exerted."

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[*] Brickell, H.M., 1961, Organizing New York State For Educational Change. Albany, New York: State Education Department.

The superintendent's power to manage change has limitations, however. When he invades the autonomies of subordinate roles, he meets resistance, and these autonomies cover most of the education and socialization processes, as well as a great deal of intra-school administration. This is to say that his power to initiate change does not translate hierarchically to a coordinate power to see it through. He must be deft at managing change, because, other things being equal, principals resent being told how to run their schools, teachers how to run their classes, and students how to run their student body affairs. Without persuasive efforts by the superintendent, they think of their existing autonomies as legitimate and the superintendent's action as trespass. Thus, they feel justified in sabotaging his program--if not aggressively, at least through indifferent participation.

There is little the superintendent can do hierarchically to stop them, since he depends upon their cooperation for the implementation of his program and for feedback. His power to innovate, therefore, is his ability to legitimize finance, and effect what the other roles of the system want or are willing to accept; his real effectiveness lies in his ability to get these other roles to want, or be willing to accept, the innovation.

The Principal As Innovator

If the superintendent is in a position to initiate change, the principal is in a position to see it through. Moreover, his close contact with the teachers keeps him familiar with the innovations they make, so that he is able to expedite changes initiated either at the bottom or the top of the hierarchy. (See Chesler, et al, 1963.) His power, of course, resides in his control of the school schedule, through which the resources, facilities, and personnel needed to carry out the superintendent's program or diffuse the teachers' classroom innovations are brought together.

However, the principal finds it difficult to innovate in the educational process without stepping on the toes of his teachers and difficult to innovate in administrative or structural matters without challenging the superintendent. He is "in between" (see Griffiths, 1963). Moreover, whatever changes he may make in his own school, he has no direct authoritative power over other schools.

Nevertheless, the tolerances open to him within his own autonomy are wide--particularly where socialization or the organization of the school day are concerned, so that it is not at all uncommon in a system to find deviant or experimental schools following the innovations of a principal, rather than a superintendent.

The Teacher As Innovator

There is a wide tendency in the literature to deny the power of the teacher to innovate, and although this denial is usually qualified, the significance of such qualifications often seems to be missed. Brickell states, for example, that "contrary to general opinion, teachers are not change agents for instructional innovations of major scope," but he adds immediately that his statement is not made "about classroom practice, but about new types of instructional programs which usually touch several teachers and which may require breaking up old work patterns."

> "Instructional changes which call for significant new ways for using professional talent, drawing upon instructional resources, allocating physical facilities, scheduling instructional time, or altering physical space--rearrangements of the structural elements of the institution--depend almost exclusively upon administrative initiative." (Brickell, 1961)

Nevertheless, there is a very low threshold to the extent and the quality of the innovations a teacher can make, because the resources available to him are much too tiny to permit his undertaking the process-wide revisions usually found to be necessary. The enormous cost of such curriculum innovations as the "new physics" dramatize this fact (see Marsh, 1964). However, even should a teacher manage somehow to develop an entirely new teaching method or subject matter presentation, he would have no way of getting it generally adopted without administrative aid (see Cogen, 1965). Whether or not teachers are innovators, they are not change agents for school systems. If the innovations they do make are to become system-wide, they must be picked up by administrators--or by some new power arrangement, such as collective bargaining. (See Chesler, et al, 1963; Cogen, 1965; Lippitt, 1967.)

But if teachers do not change school systems, it is they more than anyone--except, perhaps, the student--who make changes work or fail. This is so because all such changes ultimately find their justifications in what they do, or do not do, to the educational process, which the teacher ultimately controls.

The Student In Innovation

It is almost certain that students innovate, since the most imaginative people in the public schools are surely students, but very little is heard of such innovations, because students have even less power to implement change than teachers. Moreover, while they are encouraged to innovate in a great many subject matter areas, they are seldom encouraged to suggest changes in the teacher's own program. The teacher is generally as reluctant to accept invasions of his autonomy from below as from above.

RESISTANCE TO INNOVATION

Both education and socialization are innovation processes--but in personality systems, not in school systems. School system innovation is an administrative process and involves making changes outside of tolerance--that is, revising the structure or processes of the system itself, not simply substituting one functional equivalent for another. There are three major forms of resistance to school system innovation:

1. Incapacity to carry out the changes called for;
2. Refusal to carry out those changes; and
3. Ineffective communication.

The first arises wherever there are insufficient resources to effect the change. Such resources may include know-how and time, as well as money, facilities, personnel, etc. One of the most frequent errors in undertaking system innovations is failing to envision the far-flung side effects of primary changes and to plan secondary and tertiary changes simultaneously. As Marsh (1964) said of the PSSC program, "the need for inventiveness in bringing modern physical science to high school students extended far beyond devising materials which embodied it." This difficulty is particularly acute when individual teachers are asked to undertake drastic revisions of their own classroom programs, for they have very little in the way of resources at their immediate disposal. In the end, their ability to carry out the changes called for depends upon the assistance they are given (see Brickell, 1961).

The second kind of resistance occurs whenever there is a change in role required. Such a change is fundamental to social structure and to the organization of the school culture. Upsetting roles is a threat to order, even when no vested interests are involved; there is inevitably a period of conflict during the transition to some new steady state. Change can be refused for many reasons, but change can be expected to be resisted most when it seems to demand sacrifices in status and autonomy by traditional roles without offering them any _quid pro quo_ professionally or career-wise. Such bases for resitance are critical in public school systems, where the educational pay-off is primarily in the hands of subordinate roles.

The third form of resistance can be found in the failure of the administrative process to influence all of the roles involved in a change, as when the superintendent's proposals do not succeed in penetrating the principal's or the teacher's autonomy. It can also be seen where the change desired presumes the existence of administrative channels that simply do not exist. The establishment of team teaching, for example, is made difficult by the weakness of lateral administrative communication in public school systems.

SUMMARY

The American public school district is an open social system with a weakly drawn but relatively stable status structure, more or less turned away from outside community influences. Its four basic roles are joined together in a hierarchy which descends from the superintendent through the principal and the teacher to the student and supports all three of the most important system processes--education (in the teacher-student linkage), socialization (in the linkage from principal to student), and administration (in that from the superintendent to the student).

However, this downward flow of process is restricted at each level by a traditionally established autonomy, which limits the subordination of the role located at that level. For example, though the teacher must teach a subject specified by the superintendent and do so according to a schedule designated by the principal, he is in direct, ultimate control of most of the educational process. Such autonomies tend to become indices of personal and professional worth and are therefore defended, the defending role occupants distantiating from one another in order to reduce open conflict. But such distantiation also reduces the feedback from subordinates and blocks lateral administrative communication among peers. It therefore inhibits establishing an innovation on a sustained basis.

Through his mediation of outside influences and his control of the district, the superintendent is the principal initiator of legal and system-wide innovation. However, since the socialization and educational processes are not reducible to routine, he cannot implement his program from a distance, but must depend upon the principals and teachers for sustaining the innovation.

The teachers, isolated in their own classrooms, have little power themselves to initiate organizational change, but they are free to innovate in teaching methods and course content. The significance of such innovations, however, is limited by the poverty of teacher resources and teacher inability to effect official dissemination. The principal, on the other hand, is in a position to facilitate both the innovations of the teachers and those of the superintendent, for he controls the detailed correlation of personnel, resources, and facilities. But his importance to the other two roles compomises his own freedom to sustain an innovation except with respect to the socialization process, which he dominates through his immediate authority over the social conduct of the student.

Resistance to utilization of an innovation in the public schools arises:

(1) when there are insufficient resources to cover all the required changes, because the proponents of change fail to foresee the far-flung systemic side effects of what they have initiated;

(2) when the stability of the system is affected by non-compensated changes in its structure or value system, particularly when such changes threaten status or vested interests; and

(3) when the weak status structure of the system proves inadequate to administratively communicate the changes desired, or when those changes themselves presume administrative processes of which the system is incapable.

III

ITV SUBSYSTEMS AND UTILIZATION PATTERNS

ITV SUBSYSTEMS

The Simple Camera Chain

Cameras, receivers, coaxial cables and all the other equipment used in instructional television (ITV) are put together in a subsystem designed to serve at least three, and sometimes four, basic functions: to (1) originate, (2) transmit, (3) receive, and (4) record ITV programs. The most elementary of such subsystems is a simple *camera chain*, with a camera cabled to a receiver. The camera originates, the cable transmits, and the receiver receives, leaving only the fourth function, which can be fulfilled by adding a *videotape recorder* (VTR).

This is the subsystem used in studios to "monitor" production. It is also used in science classes and the vocational arts to magnify experiments and demonstrations so intricate or small in scale that they could not otherwise be seen by students in the rear of the classroom. Finally, it is frequently used in "self-confrontation" playback to students as an aid in improving certain psychomotor skills (*e.g.*, drama, sports).

Three Basic Variants

The camera chain with a VTR added is composed of three basic linkages: (1) camera-receiver, (2) camera-VTR, and (3) VTR-receiver. Each of these represents one of the major variants of the ITV subsystem.

In the first, no recording is possible; all of the programs come to the classroom live, like performances on the stage in contrast to those of the cinema. When ITV is limited to such a system, scheduling tends to be inflexible, because repeating programs requires re-assembling the entire production crew. In the third variant, none of the programs are live. Here ITV in the classroom is little different from the showing of educational films.

Finally, in the second variant, one of the three basic functions of ITV is missing--reception. There are no classes present, and so there is no instruction. Rather there is the production of recorded material to be used in instruction. Thus the second variant stands for the television equivalent of a motion picture studio.

Some school systems with ITV make equal use of all three basic variants. Others, like Hagerstown, are principally committed to the first; like Nova, to the third; or like New Trier, to the second and third.

THE FULLY DEVELOPED ITV SUBSYSTEMS*

The camera chain is a form of closed circuit television (CCTV). Functionally, this means that reception is selective--that is, limited to receivers directly cabled to the camera or VTR. However, such systems can become very large, the simple camera chain being expanded by the multiplication of its elements until it contains a multitude of television studios, control centers, resource centers, and hundreds of receivers scattered over scores of miles. In the early 1960's, for example, the Washington County, Maryland, closed circuit system, working out of five ITV studios, reached over 20,000 students in 45 schools connected to the television center by more than 115 miles of coaxial cable.

In such large ITV systems, the four basic functions tend to become specialized into major elements, each of which can undergo relatively independent variation. For example, most of the programs in the Washington County system originate live in the ITV studios of the television center, but some are VTR playbacks of earlier studio recordings, or of tapes made outside the studios by mobile units, or of tapes rented or purchased from the outside. And still others originate in film chains at the control center, where a motion picture projector is positioned for image pickup by a television camera.

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* For the remainder of this chapter, and in Chapter IV, the term subsystem will be dropped, in favor of the more easily (and still correctly) used term, system.

In the same way, transmission may be through coaxial cables, as at Hagerstown, or by microwave, as at New Trier and in part at Miami, or by open-circuit broadcasting, as also at Miami, and it is these differences in transmission which characterize the alternative systems most strongly.

Closed Circuit Television (CCTV)

There are two principal types of closed circuit television. In the first the circuit is literally closed, in that all the elements are joined by coaxial cable. This is the Hagerstown system, as well as the simple camera chain. In the second the closure is figurative, in that special equipment is necessary to receive the signals which are transmitted by microwave, so that reception is limited. This is the New Trier system.

The Coaxial Cable System

Coaxial cable systems have two very great advantages. First of all, they are private; they do not infringe upon the public broadcasting space and can therefore be set up and operated without a Federal Communications Commission (FCC) license. Secondly, they are not limited to the small number of transmission channels such a FCC license would allow. The Hagerstown, or Washington County, system has six channels; the system in West Hartford, Connecticut, will soon have twenty; and, in fact, were one willing to pay the price, enough coaxial channels could be built into an ITV system to carry a complete curriculum of television classes, eliminate scheduling difficulties, allowing dial access also.

The problem, of course, is the price--particularly wherever the cable distances are long and not all over the owner's property. Usually the cable system belongs to the local telephone company, which installs and maintains it for a rental charge based on mileage and the number of receiving locations. In Washington County, cable rental alone was more than $150,000 in 1963. Moreover, the mere possession of such an elaborate ITV system is a commitment to utilize it, and that means investing a great deal of money in the purchase of production of software, particularly because, being closed, the receivers of the coaxial cable system cannot individually take materials off the air, but can only receive programs transmitted via the cable.

The 2,500 MegaHertz ITFS System

In 1963 a new transmission system, the 2,500 megaHertz (mHz) Instructional Television Fixed Service (ITFS), was brought into use by the FCC specifically for the benefit of ITV. Its principal aim was to provide more channels than open circuit broadcasting at a transmission rate cheaper than cable. Though technically a form of open circuit broadcasting, it is confined to the unused 2,500-2,690 megaHertz range and to low powered signals with an effective transmission radius of not more than 20 miles, so that its broadcasts can be received only within a restricted area and through the conversion of its ultra-high frequency (UHF) signals to the channels of a standard TV receiver. Thus the system has some of the exclusivity of CCTV and is spoken of as such.

When the ITFS transmitters are located at the center of the reception area, an omnidirectional antenna is used which sends the signal out in all directions; otherwise, directional antennas are used. There is a special UHF receiving antenna at each reception site, which is usually a school building or a cluster of such buildings, and the incoming signal it accepts then passes through the down-converter and into the common cable system, which distributes it to the various receivers. This antenna-cable-receiver system is called a distribution facility, and the cable part of it is essentially the same as in the coaxial cable system. That is, ITFS eliminates only the longer cables, replacing them with a transmitter-antenna linkage and microwave broadcasting.

Applicants to the FCC for ITFS licenses in a single area are limited to no more than four channels. Though four channels are better than the one or two of ordinary open circuit broadcasting, they still are not sufficient to provide service to all the large number of subject and class sections within a large, comprehensive school system on a daily basis, and this inability imposes initial restrictions upon the use of 2,500 mHz ITV alone. A good case in point is New Trier Township, Illinois: the four ITFS channels there serve 25 schools with an enrollment of more than 18,000.

Open Circuit Television

Educational television (ETV) stations carry on open circuit broadcasting either on one of the the Very-High

Frequency (VHF) channels 2 to 13, or on one of the Ultra-High Frequency (UHF) channels 14 to 83. They use essentially the same kind of transmitting and studio equipment as commercial stations and, also like them, are required to own an FCC license and to adhere strictly to its rules and regulations.

When, as in the case of the Dade County Public Schools of Miami, Florida (Channels 2 and 17), a school system operates its own ETV stations, the use of open circuit transmission is really little different from the use of an equivalent number of channels in the ITFS: as in the latter, the longer coaxial cables are simply replaced with a broadcast linkage. What is different about open circuit broadcasting is its higher powered transmission, which provides a broadcasting range large enough to encompass many school systems, enormously reducing, thereby, the production and airing costs per classroom. In the Midwest Program on Airborne Television Instruction (MPATI), which was inaugurated in 1961, transmitting aircraft flying at 25,000 to 30,000 feet stretched this ETV range still farther to include school districts in six states, and still larger ranges are being contemplated in connection with satellites.

But this very width of range can be a serious disadvantage where there are not enough available channels to permit offering telecourse variants and flexible scheduling, for it then becomes necessary to generalize--and even neutralize--the content of programs in order to make them fit the varying curricular and scheduling needs of so many different school systems. In fact, it was precisely to generate more channels that the broadcasting range was restricted in the ITFS system.

PROGRAM ORIGINATION

Next to transmission, program origination is the most important variable in ITV subsystems. School districts which take their programming off the air from some outside ETV station need not concern themselves with program origination elements. They are, in fact, simply large distribution facilities. However, even in closed circuit systems, the program origination function of particular school districts may be very attenuated. At New Trier, for example, most of the participating elementary systems depend upon the High School District for production and airing. However, taken in their ensemble, the seven cooperating districts of New Trier Township form a single ITFS system, which, like all other CCTV systems, must arrange for its own programming.

VTR-Receiver Systems

It is not at all necessary that a CCTV system produce its own programming. It may confine itself entirely to the airing of videotapes and films. As was mentioned earlier, this is one of the primary subsystemic forms of instructional television. It was called, for brevity's sake, the VTR-receiver variant. However, even the VTR is unnecessary, if program origination is to be confined entirely to the airing of films. In that case, only a film chain is needed, together with a transmitter and the necessary controls. And when a VTR is introduced into such a facility, it may simply substitute for the film chain, playing back to the transmitter videotapes bicycled in from some other location. On the other hand, the recorder may be used, as at Stamford, New York, to pick up material from ETV stations, storing it on tape, to be played back later in a better scheduling.

The re-scheduling capacities of the videotape recorder have been suggested as a technique for overcoming scheduling difficulties in large school systems with only a few ITV channels. The plan is to introduce one or more VTR's at the head of each distribution facility--that is, between the transmitting center and the set of receivers in an individual building or cluster of buildings. In that way, the district master ITV schedule might be broken down at the building level into its constituent programs, which would then be re-assembled into a new schedule specifically tailored to instructional needs in the buildings concerned.

Dial Access

Dial access today is not qualitatively different from the sort of channel selection that goes on with any standard commercial TV receiver. The number of channels is simply larger and the selection mechanism something like the dial on a telephone. But it is still a channel, not a program, selector. There is development underway to make it the latter, but realization will have to wait until videotape recorders can be loaded automatically. Then a computer will take the dialed request and guide the resulting playback. Meanwhile, calling up the program might just as well be done by telephone, since the machine has to be loaded by an operator.

Camera-Receiver Systems

Thus, ITV systems do not have to produce their own programs. They may beg, borrow, buy, rent, or steal material from the outside, feedingit into the transmitters through film chains, VTR's, and a set of controls. However, neither do they have to use videotapes and films. They may choose to transmit live--that is, to deliver studio or mobile unit field programs to the classroom while they are being televised. This is the camera-receiver variant, and although we know of no school system where it alone is practiced, the Washington County, or Hagerstown, system tends in that direction.

Live production saves the cost of videotapes and videotape recorders. However, the difficulties inherent in live production also discourage elaborate procedures, which in effect means discouraging the more expensive production procedures. In fact, live production can be the most economical of all ITV techniques where, as in the candid classrooms at Florida Atlantic University, it simply televises in the classroom a presentation the instructor would be giving anyway.

There are important disadvantages to live broadcasting. First of all, it demands more television studios than channels and means a great deal of studio "downtime". (At Hagerstown the real limitation in ITV is not the six channels, but the five studios.) Secondly, it usually means lower quality, because production breaks and retakes are not possible, and because presentations are of necessity more closely limited to what might also be done in the classroom.

Finally, it creates scheduling problems, because repeating programs would involve producing them all over again.

Camera-VTR Systems

A third type of system occurs when the programs produced are not transmitted to the classroom, but are simply recorded. Commercial producers of software utilize this camera-VTR variant, which is the ITV analogue of an educational film studio system. Of course, production without utilization is expectably rare in school systems; instead, the variant is commonly found in conjunction with the VTR-receiver, as at New Trier.

Recorded production has several very important advantages. First of all, it makes better use of studio time, allowing the facilities to be employed after school hours and during the summers. Secondly, it promotes higher quality, because it permits retakes, breaks, delays and other kinds of production flexibility. Thirdly, it facilitates production techniques that would overtax the management of a live program. Fourthly, it provides a facsimile for shipment or re-transmission. Fifthly, it makes preview possible and thereby contributes to the improvement of utilization. Sixthly, it provides a record through which production personnel can study and improve their work. There are disadvantages, of course, such as the cost of recording, which is high. Moreover, in contrast to the production of live programming, there is a tendency for videotape production to become elaborate, expensive, and even an end in itself. Further, a tendency has been observed in some systems for videotaping to uncritical repetition of individual programs and even entire series.

TYPES OF UTILIZATION PATTERNS

Professor Matthew Miles wrote (Miles, 1967) that "probably the only really essential feature of any elementary or secondary school is that it is a social arrangement which exists for the purpose of bringing about desirable changes in children." It is true, of course, that the need of such a social arrangement--and therefore of the school--could be obviated by making instructional materials self-teaching. But until programmed learning has been better perfected, the focal consideration will continue to be, not how to produce instruction, but how to utilize it--what social arrangements are made for bringing about the desirable changes in student behavior.

The following description of utilization patterns emphasizes social arrangements primarily in terms of the relationships among ITV utilization, the school organization, and the role of the teacher. They are "pure" patterns, for descriptive purposes; in actual practice, these patterns become blurred into various unique mixes.

Single-Room Television

The simplest pattern of ITV utilization is one in which the role of the teacher vis-a-vis other teachers and the school administration remains unchanged. This is single-room television, where an individual camera chain is installed in a teaching area under the control of the teacher himself. Here television is an audio-visual aid, rather than a telecommunication device. Two of its most useful applications are (1) the magnification of instructional demonstrations, and (2) the playback of student skill performance for criticism. There are many subject areas where the instructor has to demonstrate some physical technique or process to his class as a whole, or where the student has to acquire a visible, psychomotor skill.

If the technique or process to be demonstrated is confined and intricate--as in dentistry, for example, or some phases of food preparation--the demonstration usually has to be repeated several times, the class being divided into small groups, each of which gathers around the instructor in turn. With a TV camera, however, one demonstration is enough, because, alone among audio-visual techniques, television has the power to enlarge three dimenstional objects. The camera is suspended over the demonstration and controlled by the instructor, the magnified image being transmitted to receivers placed so that every student in the room can see. The single camera chain has also been used in this way to present some physical skill of the instructor, such as typing or fingering a musical instrument, as well as for videotaping of the students' practicing these skills.

Studio Television

Most of the programs used in ITV are produced in TV studios. With respect to the classroom, therefore, they constitute a sort of "prefabricated", or packaged, instruction which substitutes to some extent for the work of the classroom teacher himself.

Several reasons are used to justify use of ITV in the classroom, the most common being that the studio can put together programs the classroom teacher has neither the time, the background, nor the resources to put together on his own--such as, for example, science instruction for the elementary grades.

The matter of economy is also heavily stressed in the justification of ITV. The distribution of the same instructional program to a very large number of classes is seen as a way of reducing the traditional labor intensiveness of teaching. The teacher time saved may either be used to lower the cost of instruction, as in the "candid classrooms" of Florida Atlantic University, or to pay for the ITV production itself, as at Miami or Hagerstown. Furthermore, it is felt that, once freed from the purely presentational chores of teaching, the classroom teacher will be able to give more time to guidance and the individualization of the learning process.

Finally, there is the matter of upgrading the quality of instruction, which is known to be far from universally high in the public schools of the United States. It is felt that studio production, with its concentrated facilities and wide access to resources, cannot only compensate for the inadequacies of individual teachers, but, as in American Samoa, even contribute to their own upgrading as teachers by showing what a lesson ought to contain and how it ought to be delivered. In fact, there is usually an attempt to single out the best, or master teachers, as studio teachers, the aim being to raise instruction throughout the entire district to the master's level.

Direct Teaching By Television

Direct teaching refers to those learning situations in which ITV is used to present the major portion of the content of a course, typically in regularly scheduled telecasts with a master teacher format. An extreme form of direct ITV teaching, one which no one advocates seriously these days for very many courses, is total teaching.

In total teaching by television the entire course of instruction is aired. It may be used by the student in the carrels of a learning resource center, or even in his own room, provided the technical cost of such individualized viewing can be financially supported. In such comprehensive programs, a studio teacher is usually employed, either as a voice-over or as a teaching face, if only to weave the various lessons together and summarize the points being made.

In total teaching by television, the interactive, socializing, tutorial, guidance, or diagnostic functions of the classroom teacher are not present, so that learning becomes somewhat like reading from a book. Little immediate feedback from or to the student is possible; there is no recitation, no discussion, and no supervision, although such things are sometimes simulated in order to generate a sense of involvement. It is this de-personalized, non-interactive characteristic of total teaching by television that has limited its utility severely.

No systems visited during the investigation utilized total teaching by television. As indicated earlier, the utilization pattern is a rare one in the public schools.

But it does exist, particularly in the field of adult education. For example, a 1964 report of the Chicago Public Schools described the broadcasting of college courses for credit to "TV-at-home" viewers, students who came to campus only for examinations and conferences. It was found that the pattern was highly successful for mature and well motivated adults, but not as successful for teenagers, even when the latter were following the TV course on campus. They needed at least an hour's classroom instruction every week from a teacher himself following the TV lessons in class and utilizing the texts and study materials prescribed by the studio teacher.

When these Chicago TV courses were modified by the weekly addition of an hour's classroom instruction, they more nearly conformed to what is typically meant by direct television teaching. In direct teaching, television is the major resource for the course, being primarily responsible for presentation of new material to the student. As at Chicago, the classroom teacher follows the TV lessons and utilizes the texts and study materials prescribed by the ITV program. But in doing so he is able to fulfill those interactive and guidance functions that are absent in total teaching by television. In short, the studio teacher utilizes only a part of the class time; the rest is devoted to the classroom teacher's utilization of discussion, recitation, supervised practice, evaluation.

This, then, is not as fundamental a change in the school's organization as total teaching--it eliminates neither the classroom teacher nor his classroom. It is a significant change, nevertheless, for it takes from the classroom teacher the complete control of presentation and interpretation he has traditionally had in the classroom. From this perspective, the role of the classroom teacher is re-defined and his status threatened. He is no longer in instructional control of the classroom, but is the representative there of the ITV team.

Direct television teaching is utilized in the schools of Washington County, Maryland, as well as in those of Dade County, Florida. Both were visited during the investigation, and the latter system is the subject of one of the case studies in Volume II of this report.

Supplementary Teaching By Television

In _supplementary television_, the TV lessons are directly related to the course of study but do not constitute its major resource. The classroom teacher has primary instructional control, most frequently being permitted to use the ITV programs at his option. It is he who prepares his own course lesson plans and organizes most of the material. What comes over television is calculated, not to displace him, but to give him _support_--to reinforce the value of his instruction with types of studio presentation he would not himself have the time, background, or resources to prepare. Such studio contributions may vary from a single program of a few minutes to a series to be shown weekly over the entire term.

Some of the programs are open-ended, in order to be used by the teacher as _springboards_ into new subject matter areas; others are designed to clarify concepts that can best be treated graphically; and still others are shown in order to familiarize the students with particular people, places, or events. A studio teacher may be used if the subject matter can be better presented in that way, but he is not pedagogically necessary.

Supplementary television does not re-define the classroom teacher's role, but it does increase his resources. In one sense, it is a labor-saving device, like the library, or like the paraprofessional who corrects papers or helps set up demonstrations. Because of it, the teacher can enlarge the breadth, depth, or applications of his course, or spend more time in individual teacher-student interaction.

Supplementary television is the dominant pattern for the schools of New Trier Township, Illinois, which were visited during the investigation and which are dealt with in one of the case studies in Volume II of this report.

Enrichment Television

Television programs delivered for enrichment have no necessary, direct relationship to the course of study within which they are utilized. That is, they do not function as specific units of the course, but bring in outside material considered to be valuable in connection with its context. For example, showing a production of Julius Caesar to a high school English class is enrichment, unless the play is in some way made a specific subject of study with regard to the goals of the course.

This pattern of utilization has little effect upon school organization. Since it is not directly concerned with the goals of instruction, it does not challenge the teacher's authority in the classroom. Its largest effect is in reducing the time available for the achievement of regularly assigned instructional goals, and in that sense it is sometimes resisted by teachers.

Instructional Mixes Of TV

Direct teaching, supplementary teaching, and enrichment are generally recognized types of educational television (ETV), the first two being collectively called instructional television (ITV). But like all "pure" types, they are to be found mixed or merging into one another in practice.

At Hagerstown, for example, the TV lesson in the direct teaching format is sometimes so separated from the follow-up that it seems like total television teaching. In Florence, South Carolina, the classroom teacher has such control over TV utilization that one is tempted to speak of supplementary teaching even though the direct teaching format is being used.

In all such cases, it is clear that the pattern of utilization is relatively independent of the way in which the lesson itself is put together. For example, a program (with a voice-over added) on the visits of animals to an African water hole might be enrichment in a 6th Grade class on Geography, support in an art class on sketching from nature, direct teaching in a course on Ethology or Animal Ecology, and total teaching in a learning resources center or in association with a museum display.

It is true, to be sure, that a TV program can never stand alone as total teaching--or even take the lead in direct teaching--unless it has its own inbuilt teacher, even if that "teacher" is nothing more than a cleverly programmed arrangement of the subject matter. However, any TV program can be made instructional by having a teacher utilize it in an instructional way.

Administrative Television

Television may be effectively utilized in school systems even without being related to instruction, and such administrative uses are particularly important because they may be used to help pay the costs of ITV or to facilitate its introduction.

TV As A Communication Service

Because it can transmit audiovisual events from a distance, TV is useful in circulation and assembly. In Florence, South Carolina, the superintendent sometimes uses the television facilities to speak to all his schools simultaneously, while in Evanston, Illinois, TV is the medium through which key personnel--faculty, administrative staff, student body officers--are made familiar to the entire student body of a very large high school. TV can also be used for student rallies, school ceremonies, the larger theatrical performances, and many other such get-togethers, obviating the costs and disturbances of big auditoriums. Finally, the outside world can be brought in over its distribution facilities in times of civic interest, crisis, or ceremony.

Extracurricular Instruction

Television is already employed for the in-service training of teachers. The transmission of courses to their schools relieves them of the difficulties of commuting back and forth to the district headquarters or some centralized classroom. It is also used for orientation purposes--familiarizing new students with the school, with the library, etc.--and for guidance, as in providing information about vocational or college entrance requirements and opportunities. During the home-room period before school each morning, TV can be used for special announcements and for keeping everyone informed on what is happening in the school.

There are many other administrative uses for television in a school system. One of the most successful has been its employment in testing, where it saves much teacher time by putting all the details of test explanation into the hands of a single person. This concentration is also beneficial in that it insures that every student in every school will be given an equal opportunity, since he will receive his test instructions from the same person, at the same time, and in the same way as every other student.

SUMMARY

In summary, some patterns of ITV utilization affect the organization of the system, while others do not.

The simplest pattern is single-room television, where an individual camera chain is controlled by the classroom teacher and used as a magnifier of demonstrations, a mirror of student performances, or a generalized audiovisual aid. But most of the TV programs used in school systems are made in studios and introduced to the classroom from the outside, studio production being justified as more economical, higher in quality, and capable of presenting things the classroom teacher cannot prepare.

In _total teaching by television_, the classroom teacher is eliminated, and all teacher-student interaction--discussion, recitation, supervised practice, etc.--is eliminated at the same time. This mode of utilization is not being advocated widely at the present time. In _direct television teaching_, the classroom teacher is retained and follows the TV presentations--which constitute the _major resource_ for the course--using the materials prepared by the studio. Thus, student-teacher interaction takes place, but the traditional role of the classroom teacher is re-defined and his status threatened; instruction control is shared by the teacher, who is now the member of a team.

In _supplementary television_, the classroom teacher remains in instructional control, with the content that comes over the air being used (optimally) by him as support for his own presentation. Finally, television is _enrichment_ when the programs used are not actually integrated into the course of study, but serve to give the student an "instructive" experience within its general context.

All of these are _types_ of utilization, and in actual practice they tend to mix and merge. Moreover, any program used as _enrichment_ becomes support the minute an instructor determines to use it as such, integrating it into the course of his presentation. It can also become direct, or even total, television teaching--even when it has no intrinsic value as such--by having "instruction" added, for example, with a voice-over.

As a last point, TV is utilized in school systems for other things than instruction--for communication, assembly, in-service training, testing, etc.--and these administrative uses may facilitate both the introduction and utilization of ITV in the classroom.

IV

IDENTIFICATION AND ANALYSIS OF UTILIZATION PROBLEMS

GENERAL PROBLEMS

During this study, several problems were found to be common to all the uses made of television for instructional purposes. To one degree or another, all of these common problems were "system associated".

The Problem Of Innovating In Open Systems

Among current writers on educational innovation, there is widespread agreement that much of the difficulty in making educational change "take" and "work" is due to the unanticipated and far-reaching systemic side effects of the changes initiated, even when those changes themselves are modest. (See Chin, 1962, 1967; Geis, 1968; Lehman, 1966; Marsh, 1964; Miles, 1964, 1964a.) Even curriculum changes, which disturb school systems far less than changes in role or status, can be very demanding, as was discovered, for example, by the Physical Science Study Committee when it was forced to make a coordinated effort of unanticipated magnitude in order to overcome the systemic complexities encountered (Marsh, 1964).

It takes a great deal of work to organize the subject matter of a course, which is why teachers make so much use of textbooks (and textbook writers so much use of other textbooks). But putting the subject matter in some sort of topical order is only the beginning; it must thereafter be related to every one of the many goals, techniques and conditions of classroom teaching. These are so numerous and complex that whenever some extensive change is called for, the teacher is hard put to find the time and resources to make all the necessary arrangements, unless he is given release time and extensive aid.

The cost of systemic change in terms of reorganization and re-education is thoroughly understood in many vocational areas outside of education. In the larger business world, in the armed services, in the more elaborate transportation industries, every important new procedure or piece of equipment typically is carefully studied and tested in all its system implications; associated materials and subsystems are developed; and personnel are extensively trained or re-trained before the fully prepared and validated system is put into regular operation. Even in show business things are done in this way: no producer would give his old cast a new script and immediately send them out on stage.

In short, if the "new physics" or the "new something else" is to be introduced to an operating school district it should first be developed and validated as an instructional system, with subject matter, teaching methods, supplementary materials, testing techniques, and promotional strategies completely worked out and coordinated. Then it should be taught to teachers on release time at full pay in a carefully prepared and managed training program. Finally, it should be introduced into schools that are fully prepared to receive it--properly provided, that is, with all the necessary facilities, materials, and equipment needed to make it work, and staffed with personnel trained to evaluate it, trouble-shoot it, and generally "follow it through".

If this is true for new instructional systems, it is just as true for new media systems. The latter also affect the organization of subject matter, teaching methods, supplementary materials, testing techniques, and promotional strategies; they may even change the role and status structures of a school district. It is important, then, that they be treated systemically and introduced with planning, preparation and care.

During the investigation it was discovered that, almost everywhere, ITV had been introduced rather hastily and without adequate pre-planning--sometimes to take advantage of grants, sometimes to acquire channels being offered by the FCC, sometimes simply in the hope of being able to upgrade instruction, or reduce its cost. Nowhere was there a pre-existing, genuine program for the integration of ITV into school system organization.

Studio teachers were unprepared to function properly, programming was largely of low quality, and yet there was seldom any real attempt at validation and evaluation. Ability grouping, pacing and scheduling problems; the high cost of software and the unanticipated quantity found necessary; the confrontation of TV and curriculum people; the resistance of teachers and principals; the feedback difficulties; and the dozens of other problems which have beset the use of ITV were only dimly foreseen. Even today, the majority of these problems remain unsolved.

It seems reasonably clear that those school systems which have succeeded in carrying ITV to its highest peak of utilization over the longest periods of time are systems which, during the innovation period, were very heavily serviced and financed from the outside. Hundreds of thousands of dollars were spent installing equipment, preparing instructional materials, and training personnel--yet none of the basic problems have been successfully solved.

Clearly, a detailed innovation program should be set up comprehending the entire installation of an ITV subsystem; the procurement of adequate software and related instructional materials; the development of instructional methods for each of the teaching roles involved; the development of an administrative system capable of efficiently selecting, delivering, and assuring the utilization of ITV programs; the training of students, teachers and administrators in their new roles; the re-structuring of status in the system to reflect the real values of the various roles involved; and the scheduling of change in terms of behavioral goals that can be effectively striven for and measured under the guidance of change-agents with specific, acknowledged, and accepted authority.

Even more important, each part of the system should have its own inbuilt quality control--that is, a realistic administration for validating lessons, evaluating utilization and measuring the program's progress toward its behavioral goals, all such knowledge being fed back into the controls of the program for self-criticism. Finally, such a program should include open agreement on the risks being taken and the sacrifices that may have to be made in terms of future innovation.

The Problem Of Hardware

Perhaps the least of all the common problems associated with the introduction of ITV is that of the hardware, yet in almost every site visit complaints were heard concerning transmission or equipment failures. There was seldom any back-up equipment; in fact, in most systems only some of the classrooms utilizing television were provided with receivers, while many did not even have outlets. It was often necessary for teachers to either fetch receivers or take their students to another room.

But even with a receiver, teachers sometimes had to string cables to outlets elsewhere. Moreover, some of the equipment was so delicate that just moving it threw it out of adjustment. This was particularly true of single-room systems. Finally, there was often so much diversity in make and construction that knowing how to operate one piece of equipment was no guarantee of knowing how to operate another, and this lack of uniformity also posed problems in repair and the maintenance of service.

All such deficiencies compromise teacher willingness to use the equipment. The teacher feels he has more productive things to do than be a hardware technician, or run about looking for receivers. The failure of a lesson through malfunction of a "gadget" makes trouble for him in lesson continuity, scheduling, pacing, and student interest, so that he is tempted to fall back on "tried and true" methods and if he is compelled to use equipment under such circumstances, he feels that not only he, but also his students, are being sacrificed for some administrator's pet idea.

Under the circumstances, it seems penny-wise and pound foolish to permit such relatively trivial difficulties to compromise ITV from the beginning--the more so, since utilization, though it is the least expensive technically of all the aspects of the ITV subsystem, is nevertheless the payoff in terms of how many students are reached instructionally for every TV dollar expended.

Simple, rugged, reliable equipment should be chosen, and then installed, proved out, and tested with the teachers before classes begin. To get the most for the TV dollar, there ought to be a receiver in every classroom, but under no circumstances should a teacher be required--or even encouraged--to use ITV unless he has immediate access to reception equipment.

Standardization should be easy enough within a single school district, but it might be worth trying for on a wider basis, since nowadays teachers move so much from system to system. Every installation should have adequate back-up equipment, an established maintenance schedule, and a system of communication between users and service people sufficient for emergencies.

Finally, it might be worthwhile for the Federal Government to consider giving aid towards the installation of distribution facilities. Such facilities are sometimes under-emphasized in school budgets because they are clearly in competition with teachers' salaries. Federal support would be a way of bypassing that competition and at the same time both aiding utilization of ITV at the least cost and facilitating the standardization of utilization equipment and practices. Of course, no such support should be accorded unless assurances are given that the equipment purchased will be used.

Teacher Training In ITV

Everywhere in the site visits the investigators were told that teachers--particularly elementary school women--were afraid of the television equipment and inept in the manipulation of its controls. But the skills involved are so simple and so limited that teaching them could surely be quickly programmed. It would then be merely a matter of going from teacher to teacher with a brief certification routine. Some teachers would resist, of course, but in so trivial a matter their resistance would be without reasonable foundation, and compulsion would be clearly justified. However, teaching the teacher how to manipulate the controls of a receiver and teaching him how to make effective instructional use of ITV are two wholly different things, a fact which many ITV proponents seem to gloss over, even while they are making much of the emergent instructional possibilities of the medium.

ITV is an essentially presentational instructional method. It does not correct, debate, discuss, or socialize with the student. Integrating it into a classroom program involving many disparate instructional goals--as all public school classrooms do--means, therefore, that special and detailed consideration must be made of what it can and cannot do, and this consideration must then form the basis of special instructional techniques. To simply thrust ITV into a school system is to force both studio and classroom teachers to improvise such techniques. And clearly, they lack the time.

The standard classroom teacher at the secondary level teaches twenty-five class periods a week. The most elementary calculation indicates that if he prepares for his lessons at all, he will exhaust what, for most people, is a week of working hours, and this is to say nothing of hall, cafeteria, or yard duties, correcting papers, faculty meetings, bookkeeping, and interviewing parents. The everyday classroom teacher simply has not the time to investigate new teaching methods. If he is to discover them and use them, he must be taken aside and trained.

This is as true for single-room as for studio television. The effective use of magnification and playback involve experience, knowledge, and practice. If a teacher is thrust into this context without preparation, he will be forced to either ignore the innovation or sacrifice the student. It is not difficult to anticipate the choice of a responsible teacher.

If ITV is to be taken seriously as an instructional medium, then it should be taught in the teachers' colleges--not just in terms of equipment, but as an instructional method. It is clearly not so taught. A primary concern of the Federal Government, then, might be to encourage schools of education to investigate ITV as a method, teach prospective teachers about it as a method, and see that they are trained in it as a method during their internship.

However, it would take twenty or thirty years to prepare the teaching profession for ITV by new teacher training alone. The already certificated vocationals would have to be trained, too. Training them could be accomplished in some systems, no doubt, through in-service programs, but, unfortunately, most in-service programs are inept and offer neither teacher credit nor compensation. It would seem advisable, then, to establish teacher training programs at fully developed training centers and on a full-time salary and accreditation basis.

THE COMMON PROBLEMS OF STUDIO TELEVISION

The hardware and teacher-training problems are common to both single-room and studio television. But there are other problems peculiar to the latter.

The Problems Of Software

At three-and-a-half hours of instruction per child per day, 42 hours of daily programming would be needed for total television teaching through the twelve half grades of the elementary school.* Much more would be required at the secondary level, where different students follow different courses of study. At New Trier's four-year high school, over 200 courses are offered. Taking half that many at 45 minutes of daily lesson time each, another 75 hours (9 3/8 hours per half grade) would be added to the total teaching load. Finally, taking 6 hours per day (the approximate average of 3 1/2 and 9 3/8) for each half grade at the intermediate level, a grand total of 141 daily hours of programming--25,380 hours for an academic year of 180 days--is arrived at as the total teaching requirement of a public school system.

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* Throughout this chapter, rough quantitative estimates are made in order to give orientation, and to allow order of magnitude insights into the problems discussed. They are not to be taken as precise quantitative analyses.

This total is a vast understatement, considering the curriculum diversity called for by modern comprehensive schools, but particularly in view of the fact that it makes no allowances for ability grouping or alternative approaches to the subject matter. Yet, the number of program hours involved per year exceeds that required for the three major networks (take 20 hours of broadcast time per day for a network station times 365 days times 3 equals 21,900 program hours).

Of course, almost no one today would suggest introducing total television teaching across the board into the American public schools, but even less than total direct television teaching, taking no more than a third of the 25,380 hours mentioned above, would consume more programming than a major commercial station. No public school system in the United States is rich enough to generate that much ITV material at any quality, let alone at that level of instructional worth which would justify introducing it to the classroom. In 1961 one of the most advanced of the ITV subsystems, Hagerstown, was airing little more than 41 program hours per week. This is less than a fifth of the requirement postulated above (141/3 X 5 = 235 hours/week).

These facts lead to the largest issue currently facing ITV--namely, how to generate enough quality programming to make extensive use of the medium worthwhile.

The Problem Of Quality

Everywhere during the site visits and case studies the investigators ran into both good and bad programming--or, at least, what seemed to them to be so, as well as to the teachers and students involved. Of course, what seems to be good or bad television instruction may, in point of fact, be otherwise; individual intuitive reactions cannot take the place of properly designed validation. But whether a program is really good or not, it must seem to be good, or it will not be utilized. This simple "truth" was borne out over and over again during the investigation. Students simply "turn off" a program they do not respect, while teachers resist having to use or to relate to it.

Nowhere in the site visits and case studies did many teachers categorically object to ITV itself. It was not the use of the medium as an instructional vehicle, but the quality of its programming that they most frequently found fault with, giving poor program quality as the principal block to utilization. Their feeling this way was of the utmost consequence, for everyone was agreed that the classroom teacher makes or breaks the television lesson by the attitudes he takes towards it in front of his students and by the way in which he conducts his follow-up. It makes no difference that his own classroom presentation may have been no better than a poor telelesson; he is in control of utilization.

But satisfying him--and his students--is conditioned by the fact that expectations are automatically higher where ITV is concerned. Everywhere studio teachers complained that they were being judged by commercial standards, and this was no doubt at least partially true. However, there is some reason to believe that other and deeper factors are involved.

Simply having oneself televised and transmitted into other classrooms is a kind of pretention, and it tends to stimulate a degree of criticism that would seem out of place directed towards an ordinary classroom teacher. Thus, the common idea of using television to spread the best classroom teachers over many classes is at least partially compromised at the outset, because a good classroom teacher can seem very bad on TV. There is a kind of relativity involved; the quality standards of the one context are not transferable to the other.

The problem, then, is not how to generate quality programming in accordance with classroom standards, but rather how to generate it in accordance with much higher standards than classroom standards. We automatically and unconsciously penalize ITV by extending to it such great expectations.

Under the circumstances, simply televising a classroom teacher using the same lecture techniques, visual aids, and props he would use in his own classroom is to handicap ITV at the outset, yet few public school systems can afford to do otherwise. Moreover, in the bulk of such cases, the studio teacher has to give at least one lesson every day, in preparation for which most of his time is absorbed in details of production, not of teaching. Finally, he may even have to be transmitted live, so that every mistake and accident is automatically built into the context of the course. It is no wonder, then, that so much of what he does seems inferior. For such reasons ITV leaders all across the country have been suggesting getting rid of the teaching face.

There is little doubt that ITV would benefit were it able to put more emphasis upon the kinds of things classroom teachers cannot do on their own--the sorts of things, that have hitherto been delivered to the classroom via the motion picture--laboratory demonstrations, site visits, and dramatizations. But a good deal that has to be taught cannot be taught the motion picture way without enormous expense. It usually costs much more to show something than to tell it, and school systems just have not got the money.

The difficulty with the motion picture is minimal wherever what you want to show is already "put together", but in most such instances the subject matter moves too fast and in too complex a way for instructional purposes. It has to be pulled apart and rearranged, and when that is done there is an enormous difficulty in the simultaneous maintenance of dramatic continuity and interest, on the one hand, and instructional sequence and pacing on the other.

The teaching face greatly reduces such difficulties by carrying the continuity itself, while, at the same time, providing the instructional commentary. While it is possible, then, to string visual materials together in such a way as to do their own teaching, it is very expensive to do so. The normal documentary has at least a voice-over--a narrator in the background, like the old travelogues--so that the "teaching face" becomes the "teaching voice", but even here the visuals have to carry their own continuity.

In summary, assuring utilization of ITV means convincing students and teachers that it is worth being utilized--that is, giving them programming they will agree has quality. But quality in television is harder to achieve than quality in the classroom, because we project onto the TV receiver much more demanding standards. This fact places most school systems in a bind, because they do not have the financial resources to produce the kind of programming necessary.

Often the best they can afford seems little better than, if as good as, the classroom lecture, and while this may be an illusion caused by the greater expectations with respect to ITV, it destroys utilization wherever teachers and students take it as a fact. (There is serendipity here, however, because the difficulty in meeting the expectations directed at ITV is generating a profound reassessment of curriculum. All over the country, educators struggling with the medium have become cognizant of this, and many are suggesting that in the end it will prove to have been the greatest service done by instructional television. In short, if the classroom is upgraded, it may be not by master teaching alone, but also by a new mastery of presentation itself.)

The Problem Of Quantity

The problem of quality immediately leads to the problem of quantity. If quality costs so much, how can school systems afford enough programming to make utilization meaningful?

It is difficult to know just how much ITV programming costs, since little accounting is available per program hour. To deal in round figures, therefore, Hagerstown in 1961 was spending well over $400,000 a year on their ITV system, including the salaries of studio teachers, but not the amortization of the original installation costs. This money was being spent to produce somewhere near 40 hours of programming each week, or more than 1,400 hours a year. Seventeen percent of class time was involved, the figure being that high because those courses most widely taught were being televised.

Using these figures to establish an order of relationships, let us say that in an ITV system, like Hagerstown, based upon direct teaching with studio teachers transmitting programs live at the rate of one per day per teacher, the recurrent costs of the system are approximately $300 per program hour for about 17% utilization. This includes the cost of the studio teacher, artists, producers, technicians, administrators, clerical help, the production of instructional materials, transmission, and props. Thus, there seems to be a meaningful economy.

However, Hagerstown has certain economic advantages not present in many school systems utilizing TV: the initial installation and system design were financed from the outside, the pay scale for teachers is low, and few television professionals are needed, most of the studio work being done by junior college students. In addition, part of the recurrent costs are balanced by the savings in teachers' salaries yielded through use of the large class, as also initially used in Dade County, Florida.

The large class is now under reconsideration, since it has proved very difficult to handle in terms of discipline, so that the cost of ITV will have to be taken in addition to teachers' salaries. Even a half million a year in addition to teachers' salaries would be marginal for most school districts, let alone the million dollars or so that would be necessary at 17% utilization to raise the quality of ITV above that of the simplest teaching face.

Of course, videotaping is another matter. It costs more, in the first place, simply because the tape and recorders are expensive. And it also tends to greater production expense, because it can be manipulated and played with in a way that closely scheduled live production cannot. But ultimately it reduces production costs by making re-runs possible, and it spreads utilization by better adapting to complex school schedules.

However, the benefits, though positive, are not as great as they seem. Not all programs can be used again the next year, because they are not all considered that successful, while most of those which are re-used may be obsolescent in three or four years, either because of content, or because of changes in context that make them strange or comical to the school children.

Thus, even with videotaping, the average school system would be hard put to produce its own ITV programming, particularly if something more were expected from that programming than the teaching face. But for the nation as a whole to produce such programming would be--economically at least--no trick at all.

National Production

The former director of one of the ITV subsystems visited during the investigation spoke of having seen a superlative Japanese videotape on open heart surgery. He was told that it was shown in every secondary school in Japan and that producing it had cost 25,000 American dollars. The price does not seem too high considering that it was being used to educate all the secondary school children in an entire nation. The same tape at the same cost in America, if shown to high school students during only a single year, would cost no more than a few mils per student. Even restricting it to a tenth of a single year group would bring the cost to little more than a nickel a head. And, if each student with a six period day saw one such film per period during the academic year, the cost for him alone would still be less than $60 a year.

Consider once more the figure of 8,460 program hours for direct teaching in public school systems. Since it was understated, raise it to 10,000. Then triple it to provide three ability tracks and double that to give two contrasting approaches to the subject matter. At $50,000 per program hour, the resultant 60,000 hours would cost $3,000,000,000. Moreover, continuation of such an expenditure year by year would yield four to five current alternatives in every course at each of the three ability levels. Certainly $3,000,000,000 a year would be significant for the American nation to spend in such a purpose, whether the sum were spent collectively, or in some kind of open market system; but it would not necessarily be out of the question--somewhere between 37 and 38 billion dollars is being spent during the 1968-69 school year on elementary and secondary education. Why, then, do school systems insist on trying to produce their own programming?

Local Production

There seem to be many answers to this question, some of them purely historical. Certain of the earlier systems developed television as an economy measure, tying the idea of master, or studio, teachers to the use of the big classroom. Others went into production to "involve" the teachers in ITV. Still others were patronizing localism with the idea that outside agencies could not produce programming to satisfy their own peculiar needs. And then, of course, there were some who simply wanted to get into the business. But none of them has really been able to satisfy its own needs for quality material, and all have, to one degree or another, had recourse to the outside.

Some have taken materials off the open airwaves and been sued. Some have duplicated films or tapes and been sued.

Many have reluctantly paid the big prices of commercially marketed tapes, although most of the material so available is judged in the schools to be obsolete, low in quality, or so watered down (in order to give it general appeal) as to be instructionally vapid. Finally, they try to exchange with one another--each shipping out its tradable best in return for the same from a dozen others. This is an attempt to regionalize and rationalize the ITV subsystems, but it comes to wreck and frustration on the copyright law.

It would be almost impossible for the local systems to themselves produce all of the visuals they have need of in their programming. Therefore, they use the visuals of others (usually in the form of film clips), securing permission to use them in the programming for their own districts. But the film clips become an integral part of such programs so that when traded, the film clips are traded with them. This means that the receiving district must, in its turn, secure permission from the required owner of the film clip to use the program.

In 1967, Dade County paid more than $30,000 in performance rights for films, and New Trier will possibly spend as much in 1969. Those in charge of audio-visuals in Miami have to deal with 480 different companies with at least 480 different policies. There is a lack of prime standardization on materials, not only between companies, but sometimes within the same company, depending on the type of utilization made. Furthermore, there is a lack of standardization on policies regarding permission to edit, or otherwise use, part of a film or videotape, or to supplement a film with local narrative.

Even in simply seeking outside material there are immense difficulties, and then the things found must be previewed and approved by those who are going to be responsible for utilization.

Rationalizing The Software Business

Currently, at least, it seems apparent that even a 15% class time involvement in quality ITV could not be maintained by school districts forced to supply their own software. There is a tremendous software gap everywhere, and until it is overcome, expectations should not be too high for increased utilization of instructional television. If industry will not take the initiative to develop quality programming at acceptable prices, and if the copyright law cannot be modified to let local production centers regionalize, then the larger governmental structures may have to step into the breach. Many of the states, of course, are already producing ITV programming--*e.g.*, South Carolina--and the Federal Government is presently engaged in a massive ETV program. Perhaps the software will have to come from such sources as these.

However, many of the local studios are excellent--the Dade County system, Hagerstown, New Trier, colleges like Stevens or Florida Atlantic--and could do consistently fine things had they the support and breadth of base necessary. Furthermore, they are close to teachers, which is where the payoff is in terms of utilization, and might be expected to keep a better tab on demand than central governmental systems. They can also make use of teachers and local administrators--

as consultants, if not in actual production. A collection of such regional studios might, furthermore, provide a good base for building up competition in production.

But these regional studios would have to be administratively (though not operationally) separated from their associated school systems and used, not as exclusive software suppliers to their own school systems, but as laboratories where the teachers and educators of the districts could study the organization and process of teaching with the specific market aim of generating improved ITV programming.

To facilitate such a practice, the Federal and/or state governments might play "angel" to the studios, underwriting a portion of the costs. They might also give the studios protection, either by assembling a sufficient library of visual materials that could be used without complications, or by undertaking legal responsibility for the distribution of the finished materials.

The Scheduling Problem

Finding enough software of sufficient quality is not the least of the general studio television problems. There is also the matter of how to deliver the software to the classroom. This may be accomplished in any one of a number of ways which, however, all distribute themselves along the line of a single polarity.

In the type at one of the two poles, videotapes are bicycled to each of the individual teachers, who then utilizes them in accordance with his own personal schedule, making use of VTR's installed in his room. (Motion pictures are handled in a similar way.) In the type at the opposite pole, all the programs are transmitted live from a single central studio straight into the individual classroom receivers. This is centralized television, and it was the basic system of some of the bigger ITV installations--e.g., Dade County and Hagerstown. However, an intermediate variety has also been used in some of these systems and consists in transmitting programs from the central studio to satellite studios in individual schools, where they are videotaped as received and then rebroadcast later.

In the first of these alternatives, there is not scheduling problem, provided there are enough facsimiles of each tape. Where a great many teachers need to be using the same lesson at approximately the same time, the cost of tapes can become prohibitively high. In the second alternative, there is no scheduling problem provided all classes of the same course can be given at the same time; otherwise it is necessary to repeat the entire program. It is the second of the two types that presents the most serious problems.

In a system made up of a single undepartmentalized primary school, centralized transmission produces very few difficulties. The teachers are generalists, each has his children in the same room all day long, and each is free to reorganize his lesson plan at any time. Thus, if classroom practice in art were scheduled for 10:00 and ITV music for 11:00, the teacher would have little difficulty in reversing the slots, should the TV transmission have to be made an hour earlier. In short, the primary teacher's day is flexible. There are some obstacles, such as the recess schedule, but they are few.

The day of the high school teacher is not so flexible. Suppose he teaches Mathematics. He will normally have two preparations--three periods of Geometry is an ITV course, the transmission will have to be repeated twice in order to hit his three periods. If it cannot be repeated, then his teaching day will have to be re-scheduled to four periods of Math Analysis, or, more likely, to a third preparation. But there may be no other teachers available to teach Geometry.

It is not only teacher scheduling that is difficult. The scheduling of students, facilities, resources, and activities is just as much so. And the task becomes more and more difficult as the number of irregular things and odds and ends accumulates. Different schools, and different kinds of schools compound the problem, because the best scheduling for one tends not to be the best for another. In large systems the scheduling becomes so difficult that expansion of ITV has been curtailed.

The intermediate type, using satellite studios, is designed to break the bottleneck between the district studio and the individual school distribution facilities. The studio schedule is dissolved and the programming it carries re-scheduled according to local needs. Each sub-district or school is thus able to schedule almost independently. However, there is a proliferation of studios and studio personnel, since each little satellite must have its operators. Also, there is the multiplying cost of more and more VTR's and videotape.

Size Of The Distribution Facilities

The necessity of repeating programs in centralized television systems also quickly multiplies costs. Few people take stock of how many cables are necessary to carry an ITV schedule effectively. First of all, though programs differ in length, they must often be "centered" in teaching periods; they cannot be jammed up against one another as in commercial TV. (At many sites, violations of this principle were noted; often, for example, the telelesson would begin before the students were in their seats and ready to pay attention.) The schedule has to be a little wasteful, to have a certain "looseness".

And to this looseness must be added the "lost time" of necessary repeats. In one system using live broadcasts and very few repeats, there was a wastage approaching more than 50%, while where repeats were used, they approached in total length 100% of the original transmission time. Since there were still scheduling difficulties in all of these systems, it seems proper to assume that they were much too tight.

Coping With The Scheduling Problem

There are three principal ways to ease the scheduling problem: (1) more channels may be laid to make the distribution system looser and more capable of adjusting to the school schedules; (2) intermediate videotape recorders may be used in sub-districts or big schools to re-schedule district transmission (this system has the added virtue of permitting the main trunk lines to be used after hours, loosening the school day schedule that much further);

(3) programs may be bicycled to the individual sub-districts, schools, or even classrooms. For example, the curriculum might be narrowed but this would be retreating from the comprehensive school. Or, TV might be concentrated in the smallest, rather than in the largest, courses, but this would reduce overall utilization and increase the cost per pupil prohibitively.

Of the three methods, the first would probably be the simplest in a small system not attempting to originate a great many program hours. The second would seem best in any large system designed to utilize TV widely, except where the distributing center is distant and has no very close administrative relationship to the serviced district. In that case, the third method might be used to get the tapes to individualized sub-district or school ITV subsystems.

Delivering tapes directly to the teachers does not seem meaningful at this time, when both the tapes and the VTR's cost so much, and when there is far from enough software available to permit considering ITV on a library basis. Later, when the quantity of software increases, the technical facility of dial access will surely also have increased, and teacher requirements may be individualized in that way.

In the meantime, the Federal Government might help the scheduling problem by efforts: (1) to bring down the costs of videotape and videotape records, and (2) to assist the standardization of such materials and equipment for ITV.

PROBLEMS ASSOCIATED WITH SPECIFIC TYPES OF UTILIZATION

Each utilization pattern--direct television teaching, supplementary television teaching, enrichment, and single-room television--has problems more or less peculiar to itself. Thus, total TV teaching (treated separately from direct ITV teaching in the following discussion for presentational purposes) can neglect many of the goals of education; direct teaching can disturb the status structure of the school system, supplementary teaching can leave administrators with little control of utilization, and enrichment sometimes can lack sufficient relevance to educational tasks.

The Problems Of Total Television Teaching

Total television teaching is very little used in the public schools, because it eliminates some of the goals of education and makes discipline difficult to maintain. Even in junior colleges, the younger students do not seem to do as well as they should. In some classes of the Chicago TV College, an hour of classroom instruction had to be added to the two weekly telelessons shown in order to bring achievement up to desired standards.

Public school education is in part custodial. There is a discipline problem, because young people are compelled to attend, whether they are motivated to do so or not. In the absence of supervision, the disaffected few may misbehave, so that, in most classes, the presence of a trained adult is required at all times. Indeed, in large classes, such as some of those utilizing TV in Dade County or Hagerstown, it is often difficult to maintain attention even with a teacher present. One unruly student or unexpected event produces a chain reaction more difficult to control than would have been the case in a smaller classroom.

The custodial supervision required need not in itself involve the use of a certificated teacher, but there are also teaching tasks to be performed which cannot be carried out adequately by total television teaching. Television teaching is essentially presentational--a "lecture" method, if the word lecture is taken in its broader sense. In part, ITV has been "sold" on such a basis, the argument being made that, since it is not necessary for lecturers to interact with their students, they need not be physically present in the classroom. One excellent lecturer might, in fact, be electronically distributed to a great many classrooms, eliminating the need to rely upon the lesser abilities of average classroom teachers, at least with regard to lesson preparation and presentation.

Lecturing has long since come to be regarded as the least effective of teaching methods to achieve many important educational goals--a method characteristic of the "subject matter oriented", rather than the "student oriented", teacher. Many educators have been trying for years to substitute methods based upon interaction, where teachers and students both are involved in the unfolding of the course. Moreover, in Mathematics, Composition, Art, and the Crafts, students need guided practice, not only in order to develop their skills, but also in order to explore those expressive and unstructured aspects of content which do not "come through" in lecture. They must learn to handle knowledge actively-- to evaluate, organize, criticize, debate, etc.-- that is, to use techniques the assimilation of which is critically enhanced by the immediate feedback from a teacher.

Mature people and high IQ motivated youngsters can accomplish many of these things on their own. High IQ students in Washington County, Maryland, did quite well with a course in Advanced Mathematics totally taught by television, and the older, better motivated students of the Chicago TV College also did well with total teaching. However, these students do well, not because they have no need of guidance and interaction, but because they are sufficiently astute and self-directed to seek such things on their own. In their case, class time may be greatly reduced and concentrated largely in presentations of one sort or another--lectures, books, ITV, or what you will--the rest of their time being scheduled for self-directed study in learning resource centers, where faculty members are available for an occasional individual consultation.

The self-directed study plan does not go over well in the public schools, where there are wide-ranges of IQ, maturity, and motivation among the students. There is some indication that it does not wholly succeed even in the junior college. Some of the faculty members interviewed at the Oakland Community College in Michigan stated that the system worked well only for the brighter students. These, they contended, availed themselves of the opportunity for frequent faculty contact in consultation and spent long hours in the learning laboratory. It was their feeling that for the bulk of the students, however, the system was too permissive.

Those who had the largest real need for tutorial help and for the utilization of resource materials were the least likely to make use of the available opportunities.

There was a similar situation at Nova High School in Fort Lauderdale, Florida, one of the sites visited. Despite the fact that the school was fundamentally committed to the idea of individualized instruction, it had been found necessary to cut down the amount of undirected time available to students during the school day, because too high a proportion of them were not making adequate use of it.

Of course, ITV at Nova was far from being total television teaching, and, at the time the site visit was made, Oakland Community College was not using ITV at all, but both instances indicate that, beneath a certain maturity level, American public school students cannot as yet be expected to pursue many important educational goals on their own. Those among such goals that television cannot handle, therefore, must be handled in some other way.

What this inevitably means is that, at a general subsystem level, the classroom teacher must be retained in ITV utilization patterns in the public schools.

Special Applications Of Total Teaching

Nevertheless, total teaching by TV has numerous important specific applications. For example, it would be an ideal medium for the advanced placement of bright, highly motivated secondary school students, who might otherwise be restricted by the limited subject matter competence of high school teachers. Moreover, such a use of ITV would serve as an economy measure, since preparing students for advanced placement normally involves low teacher-student ratios and the inefficient use of teacher time.

Total TV teaching might also prove useful in the education of the emotionally alienated--those whose interaction with the classroom teacher may be characterized by hostility. There was some indication in Dade County, for example, that Negro students were particularly well disposed towards ITV.

Further applications might be found in special skill areas, such as music or foreign language, which could not otherwise be made available to students in particular schools or below certain grade levels. In Hagerstown, for example, TV lessons in music and French pronunciation were transmitted to the elementary classrooms without requiring any special preparation or participation on the part of the classroom teachers. They were small examples of total television teaching inserted directly into the elementary school day. In Stamford, New York, similar programs were being planned in an attempt to expand the curriculum of the tiny and scattered rural schools in the area.

These examples of total television teaching in the elementary school were particularly interesting in that they managed to achieve a certain student involvement not ordinarily associated with ITV. The children responded to the French television teacher cooperatively and with almost perfect accents. In the music class there was a similar "quasi-interaction" when the studio teacher asked the students to beat out the rhythm she had just demonstrated, and later, also, when they were asked to follow her in singing a complex Greek song. The teachers objected to these lessons coming from the outside only when they themselves were prepared to teach the subjects involved and wanted the opportunity to do so.

For most of the students concerned, this sort of instruction was available in no other way, and there are dozens of basic skills which might be brought into the elementary schools in a similar fashion, giving the children an immense head start on the more detailed and specialized instruction to come in later grades. However, it must be emphasized that these lessons were conducted at a very introductory level, with little being required of the children except imitation, so that many of the academic goals of education were not touched upon. More complex studies would be less amenable to such a treatment.

There are suggestions that total teaching might be applicable even to some instructional areas of the secondary school, in addition to those concerned with advanced placement or the emotionally alienated. It might be used in informational areas where no concept building or skill development is involved--such, for example, as orientation programs, vocational or college placement informational series, etc. It might also be used--as at the elementary level--for the imparting of simple skills assimilable by imitation and explanation. In all such cases, an effective teacher might be better, since he could guide and condition the knowledge being acquired, but in these areas the needs of students are often so individualized that teacher time would be scattered inefficiently were it devoted to such ends. Students motivated by their own individual needs could use such telelessons independently, being bound only by the surveillance and general guidance of faculty members in a learning resources center. But this brings up the entire question of individualized instruction and dial access.

Individualized Instruction

There are at least two types of individualized instruction. In the first, an entire course of study is programmed, but with the separate packages advancing, not in single file, but in a stream, so that individual students can move from beginning to end in entirely different ways. This is the scheme used by Dr. Robert Glaser in the Oakleaf and McAnulty Schools of Pittsburgh, Pennsylvania. Both schools were visited during the investigation and the two courses, Mathematics and Language Arts, already programmed for 1-6 were observed in operation. Students busily followed their own individual paths, each obviously very much involved in what he was doing and conducting himself accordingly.

A paraprofessional and a teacher were present in each class, the first correcting the examinations taken by the student at the completion of each package, the second acting as consultant, supervisor, and diagnostician--circulating among the children, being sure they were on the right track, answering their questions, helping them over hurdles, and assigning them new packages, after having looked over the results of the examinations. As under Washburne's Winnetka

Plan, the educational needs not satisfied in these classes were met in other classes not so programmed.

The second kind of individualized instruction is typified by the project method, where individual students follow entirely independent courses of study under the tutorial guidance of faculty members. This is the method of guided research used in the graduate schools of universities. Nova High School in Florida has been trying to develop something like it at the secondary level.

Each of the two types makes use of resource centers, the first as a depot of programmed materials, the second as a general library collected in anticipation of the various individual student needs. The first, or Oak Leaf system, is completely structured, resource material being specifically designated for each course and limited in quantity, while the second, or Nova system, is largely unstructured, its resource materials being dependent upon the student's personal interests and therefore theoretically unlimited.

It is conceivable that total television packages would be useful to each of these systems, and, indeed, such a utilization has been investigated both at Pittsburgh and Fort Lauderdale. In either case, the idea would be to build carrels, either in the classrooms or in resource centers, installing a small TV receiver in each carrel and connecting it to the bank of videotapes available by dial access.

Dial Access

Dial access is an arrangement permitting the viewer to choose one from among the many channels available: at present, he chooses channels, not programs, as many seem to believe. Very loosely, however, dial access is sometimes used to describe an arrangement for signaling the viewer's program request to the TV control room. But currently, it does not give the viewer control of program airing.

For each program sent over a TV distribution system, there must be a source and a channel. If what is to be transmitted is on videotape, the source must be a VTR, and each VTR must be loaded by hand. Thus, if a student in a resource center wants a particular program, he must let the operator in the control room know its name or number, whereupon the latter procures it from the shelves and loads it on one of the available recorders to be sent over the first available open channel. If there is no recorder or channel available, the student must wait.

At Nova there are--or will soon be--six sources, four of them VTR's. Thus, only four programs can be viewed at the same time. But 3,000 students attend the school, each taking 7.4 subjects. Three presentations per VTR hour for eight hours would yield nearly one hundred videotape presentations per Nova day, or 18,000 every academic year. But if the studies of each student were to be individualized in the Nova sense, there would be 3,000 times 7.4, or 22,200 student presentations required.

Thus, TV at Nova cannot now serve as a major resource for individualized instruction. Those concerned at the high school recognize this limitation and look upon ITV as primarily a group, rather than an individualizing, medium, although some suggested that the difficulty might be eliminated by using portable videotape recorders, or by switching to 8 mm motion pictures.

Imagine that the number of recorders and channels were increased until every student could see one twenty-minute program in each of four of his courses per week, 2,400 presentations would have to be aired each day. Assuming 25 presentations per channel, and allowing nothing for variations in traffic, nearly 100 channels would be needed; yet those 100 channels would account for only about 5% of the student's school time.

Individualized instruction of the Oak Leaf type would be equally expensive to transmit, and perhaps just as costly in production, considering that most, if not all, of the programs would have to be specially developed for the series. Consider the programming of just four compulsory subjects--say Math, Science, English, and a foreign language--with one and only one course in each of the four per grade level of a four year high school--32 courses in all. Now take each course as 5 packages wide and 90 long, yielding 14,400 packages.

If one-fifth of these, representing one package per student per course per week, are designed to include a twenty-minute ITV presentations, 2,880 TV presentations will have to be available for use during a total of approximately 5% of student school time. And since each student would be proceeding independently, any one of these 2,880 presentations might be called for at any time. Of course, this does not mean that 2,880 channels would have to be available. With each student seeing four twenty-minute presentations a week, 2,400 student viewings would have to be scheduled on an average every day. Without allowing for variations in traffic, a 24-slot day would then have to accommodate 100 students per slot.

Precisely what the probability would be that each of these 100 students would call for a different package would have to be determined from a set of specific conditions, but it seems doubtful that much less than one channel per student would be adequate. This is because the most fortuitous scheduling of classes during an eight-period day could not reduce simultaneous demands on the transmission system below four courses. And if in each of these four courses, the dispersion of student utilization extended over no more than 10% of the packages, 180 packages would still remain highly subject to simultaneous demand.

Thus, dial access utilization of ITV for individualized instruction seems problematical at this time, primarily because of the economic problems associated with transmission and program production. It should be remembered that in both of the examples used, calculations were made such that ITV would utilize only about 5% of student school time. Moreover, the totals dealt with were for high schools only, and, in the example based on the Oak Leaf type, no more than a fourth, at the most, of the high school curriculum was involved.

The Problems Of Direct Television Teaching

Among those school systems with major ITV programs, direct television teaching is by far the most common type of utilization--and it is the type that has put the status organization of the school system under the most stress. Its defining characteristic is that it retains the classroom teacher, but makes him a member of a team which now controls content by providing the classroom with its major resource, the presentation and interpretation of new material.

Although it is not absolutely necessary that it should be the case, the telelesson in direct television teaching is usually presented by a studio teacher, who, more often than not, has effective control of its content. The length of the telelesson varies normally from about a quarter of an hour at the elementary level to as much as a half--or even three quarters--of an hour at the secondary level, such differences in length being determined by a number of factors, such as instructional purpose, student attention span, and relationship to associated classroom activities.

Since the presentation and interpretation of new material is the prerogative of the studio teacher, the role of the classroom teacher is a dependent one: during the telecast, he "sets an example" for the students by showing interest in, and cooperation with, the studio teacher's presentation, and afterwards he follows-up the telelesson with classroom activities designed to reinforce its content in those interactive instructional ways which television teaching alone cannot handle. Thus, the studio teacher--or whoever stands behind the studio teacher in the studio--is the real focus and authority. It is he who controls instruction in the classroom, and the classroom teacher is, in effect, his teaching aid.

Whether the arrangement is right or wrong, effective or ineffective, it has presented a problem to those school systems which have made use of it, because many classroom teachers have not been ready to accept the depression in traditional role and status which they perceive. Moreover, the classroom teacher has very effective means for resisting that depression, since it is he, and not the studio, who controls utilization. It is he who turns the receiver on and off, who positively or negatively sanctions the studio teacher during and after the performance, and who reinforces or detracts from the studio teacher's lesson by his own on-the-spot follow-up.

Moreover, in terms of present day school construction, it is very difficult to keep classroom teachers under the kind of surveillance that would make monitoring and correction of their utilization possible. Everywhere in the site visits and case studies it was discovered that central administrative knowledge of what was taking place with ITV in the classrooms was extraordinarily limited. Principals, of course, are better able to keep tabs on what the classroom teacher is doing, and the repertory of rewards and punishments at their disposal gives them an effective means of putting recalcitrants under pressure to conduct themselves in the administratively desired way.

But direct television teaching has tended to alienate many principals also, reinforcing, rather than undermining, the teachers' positions. In part, this has been because these principals feel that their traditional role in the determination of content has been bypassed, like that of the teachers, but in the main it has arisen from the fact that their traditional control of the school schedule has been transferred to the district television studio, whose transmission schedule now prevails.

This resistance of many teachers and principals has been the prime cause for concern in many, if not all, of the larger direct television teaching public school establishments. With the failures of inadequate advance training and the normal measures of reward and punishment, efforts have been made to solve the resistance problem by getting teachers themselves involved in the control and creation of the ITV program. But these efforts have not been too successful, both because the basis for involvement is inadequate, and because many teachers suspect such involvement to be a betrayal of their own responsibility and interest.

Teacher Involvement

Attempts to involve teachers have, for the most part, followed two distinct courses: (1) attempting to bring classroom and studio teachers together as the co-members of a team; and, (2) attempting to limit production to programs following teacher established specifications.

The ITV Team Concept. Implicit in the team concept is the assumption that the team members will operate jointly--planning together, sharing instructional tasks and goals, watching each other teach, joining together in the evaluation of instruction, holding discussions on teaching and the effects of teaching, assigning appropriate tasks to team members, and making joint determinations of policy (see Shaplin, 1964). The team, not the individual teacher, controls the classroom and its students.

With respect to the ITV team, such "jointness" is very difficult. In most systems, there are too many classroom teachers spread too widely and with too little release time to make planning together by all, anything but symbolic. District ITV supervisors and studio teachers are rarely able to visit any given teacher's classroom. Moreover, the members of the team typically are on distinctly different status levels--the studio personnel on the superintendent's personal staff, the teachers at the status bottom for staff in the district. It is not a team, then, that always assigns tasks, but frequently it is the district head of the team. Finally, programming--with its determination of content and interpretation--frequently is carried out in the studios by studio personnel alone, so that in this situation there is no real sharing of tasks.

The Teacher Controlled Curriculum. The story is much the same with the teacher specification of curriculum, an idea calculated to commit the teaching staff to an ITV program by getting them to frame and underwrite the prospectus of production. At Hagerstown, Dade, New Trier, and elsewhere, elaborate mechanisms were set up to accomplish this task.

Workshops were organized for the summer and ITV committees established for the academic year in order to examine program needs from the standpoint of the classroom. Then, detailed course outlines were put together as "guides to production". However, there frequently is an immense latitude between such outlines and the finished product, and, more often than not, teachers claim not to be able to recognize their specifications in the final issue. In short, they are unwilling to be bound to the product simply through having been involved in defining the requirement.

At New Trier, therefore, involvement was carried one step farther: the teachers were included in the production process. But even this strategy failed, first, because most teachers had neither the talent, the interest, nor the time to engage in production; second, because those who did engage seldom succeeded in producing an acceptable result; third, because choices between competing teacher suggestions and completed programs fell back into administrative hands, for want of any other institutionalized decision-making mechanism; and, fourth, because one teacher saw no reason for supporting the utilization of an ITV program simply because it had been produced by another teacher.

Organizational Problems

The Large Class Dilemma. One reason for using direct TV teaching was to save money, although this reason was originally associated with total television teaching, where it was thought that a single studio instructor could be spread through any number of classrooms, saving enormous sums on teachers' salaries. It was argued that during lectures the size of a class made no instructional difference, so long as all students were able to see and hear adequately. Since the use of multiple television receivers could assure good seeing and good hearing, there was every reason to attempt to use ITV to such an end.

However, total television teaching proved inapplicable to teaching in the public schools. It was found necessary to have at least one adult in every classroom. Nevertheless, so long as what was going on in that classroom was lecture, the large class argument still seemed to hold. Instead of thirty students for each classroom teacher, there would be ninety or two hundred.

At Hagerstown, the large class was maintained only during the telelesson, the follow-ups being carried on in regular sized classes, while at Dade, some of the follow-ups were handled in the large classes also. In both cases, the classroom teachers were present during the television transmissions, and there is no reason why they could not have been giving the lectures themselves, thereby saving the cost of the studio teacher. For a great number of the larger classes at Hagerstown, a teacher at the front of the room would have been as visible and as audible as the studio teacher, while, for the remaining few classes, which were held in auditoriums, the single-room TV magnification of a teacher on stage would have been wholly adequate.

Therefore, money saved through the use of larger classes in direct television teaching is not saved by virtue of television, but simply by virtue of the large classes. Moreover, neither at Dade nor at Hagerstown were absolute economies achieved; in both cases the use of the large class simply cancelled out the cost of the studio.

Upgrading Instruction. A far more important reason for using direct television teaching was to upgrade instruction in the public schools. Investigations had indicated that the average academic competence of public school teachers was low relative to that for other college graduates, while in terms of performance quality, the range of variation within the vocation was very large. The organization of the public schools was not designed to compensate for these facts.

Beginning teachers and veterans, gifted teachers and the barely mediocre, had the same authority and bore the same responsibility. Moreover, teacher tenure and the automatic nature of teacher salary increments did nothing to reward merit, encourage self-improvement, or stimulate competition. Consequently, measures were needed to distribute quality teaching more effectively, to encourage it, and to identify it as the target of a healthy professional rivalry. It was thought that direct television teaching represented just such a measure.

The idea was to single out the master teachers, give them extra time and the facilities of the TV studio to prepare their lessons, which would then be distributed to all the classrooms. By simple algebra, the quality of instruction would then be bound to rise. But what takes place in the classroom frequently cannot be calculated by simple algebra.

The educational process is a system, not an aggregate of isolated acts. The studio teacher is not simply added to the classroom teacher, for the meaning and effect of each is a function of his relationship to the other. As has already been suggested, the best conceivable studio teacher can be wholly compromised by an indifferent, hostile, or inept classroom teacher, while the very best classroom teacher can be equally compromised by a forced use in his classroom of poor quality ITV programs. In short, a new and bizarre kind of addition may take place in which excellent studio teachers plus excellent classroom teachers can make bad education.

And this sort of addition does take place. In one of the largest and best known of the ITV subsystems visited, a group of students with very high academic standing volunteered the opinion that struggles between studio and classroom teachers disturbed classes more than anything else and caused students to detach themselves from an interest in the subject. Some teachers in that same system protested to the investigator that they were "not being allowed to teach," that the whole purpose of their entering the vocation was being undermined. And one distraught principal declared that his teachers fought the domination of the studio as long as they could, and when they were no longer able to fight, simply gave up, and "weren't worth a damn anymore."

Centralization Of Decision-Making

As it has been frequently used, then, direct television teaching in the public schools has tended to extend the authority of the superintendent over the educational process by diminishing the autonomies of the principal and the teacher. It represents a centralization of decision-making.

New statuses frequently are created by moving the ITV supervisors from their positions on the district staffs into line roles intermediate between those of the superintendent and the principal. In this situation, a new administrative echelon is created and given decision-making powers hitherto reserved to the school or the classroom. The plotting of the educational process and the school schedule are moved to district headquarters. The classroom teachers' and principals' jobs are routinized, which is to say that neither role may freely innovate or improvise, but must limit itself to the alternatives presented, or implied, by the work of the ITV studio.

Complete centralization assumes that individual student needs can be assessed from the superintendent's office and met by instructional measures prescribed without direct reference either to individual students, individual classes, or individual schools. All the Johnnys studying subject A at level X are required to lockstep at the same standard pace through the same sequence of subject matter. Thus, direct television teaching can be a school system innovation in direct opposition to the trends of the times, which emphasize individualization of instruction and the making of decisions at that level of operation where the roles are most deeply affected and the issues best defined.

Coping With The Problems

Clearly, the problems associated with direct television teaching _as it has been used_ are serious. They need not be viewed, however, as totally intractable, forever; quite the contrary. If the quality of ITV programs are empirically established in terms of student learning, good teachers and principals will utilize them _if_ their traditional roles, autonomies and statuses are re-defined in professionally and personally satisfying ways, including associated career and emolument considerations. The ultimate goal of quality education--defined in terms of student-learning--cannot be sacrificed for instrumental goals, however traditionally hallowed they may be--and secure, capable principals and teachers will be the first to defend this proposition.

When direct TV teaching is transmitted live, there seems to be no escaping some problems of centralization. Previewing and re-scheduling are very difficult, and the whole system has to move at the same pace, despite internal differences in organization, needs, and facilities. Unable to preview, the classroom teacher is largely dependent upon the studio; any initiative on his part "to adapt" the telelesson to the particular needs of his class is difficult. Finally, since the programs are unrecorded, it is difficult to validate them, and whatever feedback occurs must be carried largely in the abstract.

Videotaping lays one foundation for feedback and validation, permits previewing, and provides a way to reduce scheduling difficulties by installing VTR's in each school and permitting the principal to draw up his own schedule, using tapes transmitted or bicycled down from district headquarters. (Such a decentralization would also lighten the load on the TV transmission system.)

There is no easy way, under direct TV teaching, of eliminating the studio's prescription of the content to be used in classroom instruction. If a whole series of alternative telecourses could be provided in each subject, the teacher might be able to work from all of them together, picking and choosing a combination to suit his own conscience and the needs of his students. But such a solution would be far beyond the means of individual school districts, since it would necessitate quality software in very large quantities.

There are special instances in which direct TV teaching _as it has been used_ is applicable--in elementary schools, for example, where the classroom teacher's instructional responsibility is so large that he sometimes welcomes having it narrowed. There also are cases in which it may be worth introducing direct TV teaching, despite its tendency to generate status conflicts, because the existing classroom teachers are so hopelessly inadequate that instruction could hardly be made worse by any measure.

The problems which have been associated with direct television teaching have led some members of the educational community to emphasize the philosophy of _supplementary television teaching_.

The Problems Of Supplementary Television Teaching

While in direct TV teaching, the classroom teacher serves to reinforce and follow-up the telelesson, in supplementary ITV the telelesson serves to reinforce the teacher's presentation. In the latter case, it is the classroom teacher who brings the "major resource" to instruction--who "writes the course", so to speak, using television--much as he utilizes books, films, and field trips--to extend the range and quality of his own teaching.

In effect, this makes the studio the client of the classroom teacher, "legitimizing" his traditional control of utilization and bringing problems out into the open that tend to be somewhat masked under the other forms of ITV. The most formidable of these problems is administrative--the superintendent's dependence on the classroom teacher.

The Administrative Problem

As was pointed out in Chapter II, the superintendent, acting with the support of the board, is the only staff member of the American public school system with the power and the authority to initiate major innovations. In fact, the making of such innovations is an implicit function of his role, and, to a large extent, he is judged by their success or failure.

If he is to be held responsible for spending the district's money on expensive TV transmission systems and costly programming, he must feel assured that such things will be used. However, classroom teachers also conceive of themselves as having a responsibility--namely, to see that whatever is brought into the classroom has some specific value there consistent with the instructional plans and objectives they have identified as relevant and desirable.

In direct television teaching, this conflict between the superintendent's and the teachers' responsibilities tends to be settled in the favor of the superintendent. In supplementary TV teaching, it is settled in favor of the teachers, who are no longer required to accept every program the district office chooses to provide. Thus, in supplementary ITV, the superintendent frequently is forced to innovate speculatively, taking risks which the public behind him may not feel it can afford, and which school boards are sometimes reluctant to allow.

It is in the attempt to obtain guarantees of utilization that many superintendents involve teachers in the innovations they are currently promoting.

> "The language which has been developed to describe school administration," wrote Brickell (1961), "a language used almost universally by practicing administrators as well as by college professors in the field of administration, is not descriptive of the actual process. Phrases like 'democratic administration', 'the team approach', 'shared decision-making', and 'staff involvement' are commonplace. Behavior to match them is rare.
>
> "His subtle leadership--or undercover direction--is thought by the practicing administrator to be most successful when he can say at the end: 'They think they thought of it themselves.'"

The Educational Problem

Under supplementary television teaching--or any other manifestation of the educational process over which the teacher has final control--the public school administrator tends to find himself facing a closed subsystem. This "closed" characteristic, based on traditional teacher autonomy, is reinforced by teacher tenure and the single salary scale, until, whatever may be the questionable quality and nature of instructional practice in a district, there is little that can be done about it without the active compliance of those whose practice is being questioned.

This situation appears to be the principal shortcoming of supplementary ITV with respect to the educational process. It is to upgrade instruction that ITV is frequently introduced, and this objective cannot be realized where teachers are given the option to continue in obsolete and questionable practices. If the improvements offered in the telelesson are to be left contingent upon teacher acceptance, then the use of the medium may not be justified, considering the high cost of public school television instruction.

The Economic Problem

Supplementary television instruction is the most expensive of all the utilization types, because it is the least standardized and the most speculative. The classroom teacher is like a consumer in a consumer's market. Whatever fails to take his fancy is a total loss and must be paid for out of the "profits", so to speak, from more popular programs. Even the transmission system is speculative, for placing a receiver in the teacher's classroom does not compel him to make use of it. Finally, program quality must be such as to satisfy both the tastes and the standards of the teachers, which, in terms of what was found out during the site visits, suggests the expense of fully professionalized production.

REFLECTIONS ON PROBLEM-COPING STRATEGIES

Minimizing The Investment In Local Production

Instructional television should never be introduced in the absence of specific curricular needs as determined by a system analysis. By foregoing big local studio production systems, at least in the beginning, the superintendent can avoid being caught with a larger ITV commitment than he can justify in terms of utilization. There are all sorts of relatively "safe" areas of ITV investment--areas such as Elementary Science, Social Studies, or Driver Education, with an established inventory of software and a history of successful ITV, or motion picture application.

Every curricular area programmed should be capable of standing on its own. Preferably, it should be budgeted and developed independently, perhaps with its own videotapes and VTR's organized into intra-school or intra-departmental TV complexes, such complexes themselves being treated as parts of the specific instructional systems involved.

Justification for the installation of hardware and distribution facilities on a more widespread basis might be found in using TV for other purposes than instruction--for administrative communication, the activities program, enrichment, or as a general audiovisual tool. Finally, when the collection of individual and self-justifying applications has become sufficiently extensive, it may then be reorganized as a single master system designed to optimize the efficiency and the potential of the medium.

In minimizing the initial investment, complete dependence upon local software production probably should be avoided. Production at the district level is not only expensive, in that its utilization base is so narrow, but also inadequate in the long run, since districts are typically not rich enough to invest in the kind of high quality, mass program production needed to supply a fully developed ITV subystem.

Outside programming (when available) can be rented or purchased in the quantities necessary, without having to be concerned about how those quantities relate to production facilities and schedules. Moreover, the renting or purchasing district has no need to concern itself with anything but prime program quality, whereas districts with local production facilities of their own must either accept poor programs as an investment loss, or compel them to be used, whatever their shortcomings. Such investment losses are difficult to absorb in most school systems.

Much of the argument offered for local production is based upon the strategy of teacher involvement. It is claimed that teachers will not accept outside programming, that if ITV is to be successful in the public schools, it will have to be tailored to specifications laid down by the classroom teachers asked to utilize it. Some go so far as to say that the teachers will have to plan and produce the programming themselves.

However, almost none of the teachers interviewed made such claims. On the contrary, they were inclined to scoff at the idea of teachers taking the part of television professionals, and, more often than not, they rejected local teacher-made programs in favor of others imported from television centers on the outside. Whether ITV programs were of local or national origin, subsidized or commercial, did not seem to be critical; what counted was whether they were worth using. Local production is not necessary, therefore, in order to stimulate utilization; quite to the contrary, it can be a handicap, if its limited investment base commits the system to a lower quality in programming.

Actually, there is no functional need for keeping the studio attached to the district itself. The site visits demonstrated, for example, that efficient studio work and competent classroom teaching could be undertaken by the same person simultaneously only with great difficulty. Each task is a full-time activity. Teachers brought from the classroom to the studio, therefore, need not remain in the vicinity of their schools. On the other hand, there are very good reasons for separating the studio from the teaching district, the most prominent of such reasons being that the combination of the two tends to generate administrative conflicts.

ITV studios, like textbook houses, control educational content to a certain extent. Since the producers of books, or telelessons, are not directly affiliated with the teaching district, their control tends to be diffuse and limiting, rather than coercive. The district is not told by any given production house what it must use; rather, it is told by the industry as a whole what the available alternatives are--that is, what it may use.

But when the district itself owns the studio, the latter tends to a monopoly on local ITV utilization, and this brings it into status conflict, not just with teachers, but also with the most highly placed curriculum people on the superintendent's staff. Such conflicts were found in most school systems visited and they tended to be particularly bitter, pitting the educators against "TV" people in a struggle, more factional than competitive, for control of the district's educational program.

Providing Change-Agent Mechanisms

Minimizing the investment may help to protect the district from the failures of overselling and unfounded expectations. It can allow the district administration to proceed at an innovation rate commensurate with its ability to meet and solve the inevitable systemic problems as they arise. But it does not, in itself, promote utilization. To extend the practice of television teaching, an agency directly under the power and authority of the superintendent and specifically charged with the management of innovation may be useful. In promoting ITV, it might be the functions of such an agency to:

1. locate groups of competent, dedicated, popular district teachers interested in some particular phase of ITV and willing to serve as change-agents in bringing that phase into the district through their own classrooms;
2. locate instructional TV systems serving the above mentioned phase and already fully developed, "shaken down", and validated;
3. bring the volunteer teachers into contact with such instructional systems in order to study, practice, and assimilate them; and
4. expedite the introduction of the said systems into the district classrooms of the volunteer teachers, which classrooms would thereafter be used as demonstrators in stimulating diffusion of the new instruction to other teachers throughout the district.

Since the number of current innovations in a school district is usually large, it might be necessary for the superintendent to appoint for each of them, or for each group of them, a project director charged, like the project directors of industrial R & D, with responsibility for carrying the innovation from its earliest planning stages to its establishment as standard district practice. Each such project director preferably should be an effective classroom teacher, prepared to manage promotion inside a peer group relationship, and trained both as an innovator in general and in the particular innovation to be introduced. Coming directly from the superintendent's office, he would carry the authority to marshal resources and to conduct the necessary reorganizations, while, being on the spot, he would impart the presence and continuity required for the maintenance of enthusiasm and effort.

With the establishment of ITV as standard practice, a project director might no longer be needed. But there would still be need for local ITV coordinators, who, as popular classroom teachers experienced in ITV, would consult directly with utilizing teachers, giving information and advice, expediting requests for service, maintaining liaison between all parties concerned, and bringing feedback to the school and district levels. Such service-oriented, person-to-person intermediacy between teacher, supplier, and administrator was found to be of the utmost importance to the spread of utilization both in supplementary ITV and in instruction through the use of the motion picture by the school system of the New Trier Township in Illinois.

The Sine Qua Non - Quality Control

As has been suggested, one of the traditional characteristics of American classroom teachers is their isolation from one another and lack of doctrinal unity. In this sense, they form an ideal culture for getting innovation started, but a poor one for establishing some new orthodoxy. If utilization of a given change is to become universal among them, it will have to be helped by some sort of coercion. However, as has already been repeatedly suggested, administrative coercion has been ineffective in most places, so that some other basis for acceptance will have to be found. The most obvious of all such bases are two: objectively demonstrable arguments and peer group opinion. Either of these can be resisted separately, but taken together, they tend to be compelling.

However, objectivity of argument has been difficult to come by in the ITV programs of the public schools. Nowhere in the site visits were school districts found with adequate operational systems of quality control, with student performance at the core. In fact, most of the district offices had only a vague knowledge of what was going on with ITV in their own classrooms, and only a few were making serious attempts to establish methods of telelesson validation. Under such circumstances, the value of ITV is testified to be nothing more than an innovator's personal conviction; and objected to by nothing more than a teacher's personal opinion.

Consistent with previous research finding regarding audio-visual aids, very few objected to TV as a medium, per se. The teachers couched their objections to ITV in terms specific to particular courses and programs, attributing their resistance to using materials which seemed to them to be low in quality, or irrelevant to the instructional goals of their classrooms. In short, in the absence of objective evaluations, they were judging subjectively, on the basis of their own classroom experience.

It would seem, then, if ITV is to become widely used in a public school system, that it must be brought before the teachers in such a way that its value will appear to them as objectively demonstrated. This suggests initially innovating with already tried and tested instructional television programs. But it also means establishing channels for feedback, so that difficulties which arise during installation can be quickly detected and eliminated. Finally, it means comparative testing--something broad enough to embrace variations in instructional technique and content, but concrete enough to distinguish degrees of educational growth.

Given an ITV innovation as an objectively demonstrated improvement, the visible truth of that fact will tend to encourage teachers to its utilization. Efforts to adopt can be more effective if teachers are offered support in making the transition to ITV and their new role recognized with proper emoluments. After a few respected teachers have made the change, expressing their approval of it, others will tend to follow. This is the typical "diffusion-of-innovation" process as applied to utilization, and facilitating it should be a major objective of school district administrators who are confident enough in the merits of ITV to introduce it in the first place.

V

CONCLUSIONS AND RECOMMENDATIONS

SYNTHESIS

Many of the problems associated with the use of ITV in the public schools arise from the difficulties of innovating in open systems. The solutions of such problems are necessarily system solutions, and they are often far more complex than expected.

More often than not an innovation is only one element in a vast network of change, the whole of which must take place, if the goals of the innovation are to be realized. Much so-called resistance to innovation is a result of inadequate innovation--a change insufficiently comprehensive to sustain itself. Of course, genuine human resistance also does occur, because the functioning of an open system depends to a great extent upon its ability to maintain its own steady state.

Any major innovation involves basic reorganizations which must include strategies for effecting secondary, as well as primary, changes and techniques for coping with the inevitable defense mechanisms. The entire complex of associated effects need to be scrutinized carefully beforehand and the innovation introduced with a fully developed and systematically organized innovation program, comprehending all the necessary technical, operational, instructional, administrative, evaluation, and training subsystems.

Planning of so thorough a nature has seldom, if ever, been undertaken prior to the introduction of ITV into public school systems. More often than not, the instructional adoption of the medium has been a response to FCC channel offerings, or to offers of grants associated with ITV experimentation; sometimes it has been the result of an uncritical a priori commitment to change itself; and in more than a few cases, it has been undertaken hastily on the presumption that it would save money.

The most important factor in the success or failure of innovation in open systems is the structure of the system itself--in part because system processes are organized in terms of structure, and in part because structure, being basic, is more resistant to change.

In the traditional American public school system, administrative process flows downwards from the superintendent to the student, but is interrupted at each level of the hierarchy by an autonomy, the existence of which modifies the subordination of the role at that level. Each autonomy is taken as a measure of personal or vocational worth and defended by many as such, particularly against superordinate role occupants, who frequently see such efforts as impediments to their own exercise of authority. Lower roles tend, therefore, to distantiate from higher roles in order to avoid the loss of autonomy, and this withdrawal dampens the feedback process running upwards from the classroom. Distantiation also takes place between role occupants at the same level, who fear the loss of autonomy through competition, but the lateral relationship of roles is so weak in public school systems that distantiation is hardly necessary.

In many ways the job of the traditional classroom teacher may be considered to be obsolescent, just as, a generation or so ago, was that of the general practitioner. But so far, the applications of ITV have not adequately addressed the problem of vitalizing a modified role; they have threatened its status by seeming to reduce its autonomy. There are some indications that the role of the classroom teacher can be brought up to date in several non-threatening ways--for example, through team teaching, which, working through the weak lateral structure of the school system, modifies the individual teacher's power, not by reducing it, but by pooling it with the power of others.

The sense of these facts became apparent during the investigation, because innovation with ITV works like an X-ray in revealing the essential strains and stresses of public school system structures and processes. Indeed, much is being made at the present time of this analytic capacity exhibited by the medium. Some people are suggesting that ITV innovation be pushed, if only for its value to research on, and its efficacy in awakening teachers and administrators to the needs and the deficiencies of, contemporary curriculum, methodology, and organization in the public schools.

The cost of introducing ITV is in addition to the existing costs of public school education, and school boards therefore expect utilization to be high. In fact, their expectations are often confused and unrealistic, so that, in the end, there is disillusionment and over-reaction against the use of the medium.

Until a team approach can be effected, the development costs of ITV must be added to the regular cost of teacher's salaries. At Hagerstown, Dade, etc., it has assertedly been paid for through the use of large classes, but since such classes are not dependent upon ITV, the saving cannot be ascribed to the medium. The fact that ITV initially means more money has inhibited its use; when money is spent, intensive utilization is expected.

Despite this fact, utilization has been quite restrained, running from two or three percent in systems like New Trier to a maximum of about seventeen percent at sites like Hagerstown. There, less than forty subjects were actually being taught by TV in 1961, the apparently high utilization rate having been achieved through televising as much as sixty percent of the class time in a few secondary courses with high enrollments.

There seems to be no well-developed basis for determining how much utilization is either desirable or possible. The matter demands intensive study before definitive guidelines can be developed. But an excellent case can be made for the argument that ITV every day is far too much presentation at the expense of interaction, guidance, and student practice. Moreover, it is more or less generally agreed that the telelesson should occupy only a part of the class period, both to permit follow-up and to avoid overstretching the student's attention span.

It, therefore, seems doubtful that a utilization rate exceeding twenty percent of class time would be justified in any but a very few subject areas. For school districts as a whole, twenty percent utilization would mean having two or three telelessons a week in almost every one of the several hundred courses offered. But that would mean a quantity of software approaching the programing necessary for a commercial network station. Even at ten percent, utilization on this basis would vastly overtax the financial and organizational capacities of most American school districts.

Simultaneous across the board introduction of ITV in a school system does not seem justified at any time. More modest applications seem not only justified, but even desirable. There are nuclei of interest and need in public school education that would permit developing the medium on a school or departmental scale. When enough nuclei had been developed to support a general system, the necessary articulations could be made.

Many of the already demonstrated applications of public school ITV cluster about organizational or subject matter foci and suggest coordinated developments on a school--or department-wide basis, with an opportunity for high densities of local utilization, for completeness in the distribution facility, and for concentration in terms of software. In studio television, such a focus of application is preferable to a spotty approach, not only for economic reasons, but also because it carries ITV beyond the individual teacher to an organizational utilization that has a tendency to grow and perpetuate itself.

However, TV for the individual teacher can also prove valuable. Of particular interest in this connection is single-room television: Mirror TV, for example, brings an entirely new instructional possibility into teaching. Single-room television can be economically justified on an individual teacher basis, and it is worth promoting, therefore, because, while contributing something in its own right, it establishes a TV climate in the school without creating a disturbance.

When enough ITV clusters have been built up independently in various schools, departments, and classrooms, a synthesis might be made for efficiency's sake, as well as to facilitate the further utilization of the medium. Both administrative television and enrichment could be used to facilitate such a synthesis: administrative TV can be justified in large schools and school systems as a means of facilitating communication, creating unity, and developing the activities program; enrichment can be used to pave the way for other TV applications by creating an interest in, and a respect for, the potentialities of the medium.

Finally, it should be said that no evidence presently exists for assuming that every school system should have an ITV subsystem, or that once installed, it must be retained. It is quite conceivable that some school systems can achieve desired educational goals in their environment without an ITV subsystem, or that conditions may change so that an ITV subsystem no longer makes the contribution it may have made initially. These observations suggest that an indispensable, propaedeutic requirement for adoption of an ITV subsystem is a thorough, systematic, analytic examination of a school system's goals and its resources for meeting those goals. ITV, if it is to be successfully utilized, must be sufficiently innovative, as mentioned earlier; however, the school system equally must be sufficiently revolutionary, as a context.

CONCLUSIONS

The principal findings of the study were the following:

1. ITV subsystems are being utilized for direct teaching, supplementary teaching, enrichment teaching, and for administrative communications, in various patterns of use in school systems. No consensus among the school systems, or within any given school system, existed regarding the most desirable pattern of use, pedagogically or economically. However, most school systems felt that ITV utilization for either enrichment or administrative purposes alone, or for both together, was not justified economically; use in either direct or supplementary teaching, or both, was felt to be necessary for most school systems.

2. An adequate--reliable and accurate--index of classroom utilization has not been developed. In most school systems, utilization was equated with broadcast time; all school systems agreed that this was an inadequate index, at best, which overestimated actual classroom utilization.

3. Even with this inflated index, most school systems reported that their utilization rates needed to be higher for them to consider the ITV subsystem to be efficient. The highest utilization rate reported was 17% of class time, which was in the Hagerstown, Washington County, Maryland, school system. Experience is not yet adequate to define the utilization rates that would be pedagogically or economically desirable for any given type of utilization pattern.

4. ITV classroom utilization, as a process independent of production and transmission, has received an inadequate allocation of resources in school systems. More often than not, classroom utilization aids, adequately compensated teacher-training, equipment maintenance, objective classroom program evaluation, and formal utilization feedback systems if existent were insufficiently programmed and supported in the school systems to have had a significant impact on ITV utilization rates.

5. ITV utilization was lower than possible in most school systems because of the lack of a large enough quantity of high quality software. Most of the in-use programs were of uncertain objective quality because of the lack of formal, continuing, student-performance classroom evaluation procedures. Whatever their objective quality, students and teachers subjectively felt that most existing programs were of poor quality. Undoubtedly, many were using commercial TV as a standard, but this single factor cannot account for the wide-spread impression of generally low ITV program quality.

6. Poor program quality was found to be related to several factors. Basically, the "cottage industry" approach to ITV program production, characteristic of many of the school systems visited, in which it is envisioned that most of the ITV programs to be used by the system would be produced within the system, has been a failure to date.

a. Production costs for local program production have been the single largest ITV operating budget line item. Even then, the resources have been inadequate for producing high quality programs because the resources have been spread too thinly over too many programs.

b. The relief from high local production costs that was anticipated through "program-sharing" among school systems has not occurred; program-sharing has run afoul of existing copyright laws. These contain a tangle of restrictions related to use permission and fees. Two key issues are: the residual rights of teachers involved in producing a program; the use permission and fee paid for a proprietary "clip" used in a program not being applicable for the program's use by a "borrowing" school system.

c. Attempts to insure high classroom utilization of locally produced programs through "involvement" of classroom teachers in the production process have been counter-productive in terms of both program quality and teacher acceptance. Most classroom teachers have neither the desire nor talent to be so involved; there seems to be little positive transfer from the ability of some teachers to recognize a "good" program to an ability and willingness to produce one.

d. Agreement on program specifications is difficult to achieve among teachers themselves; teacher views frequently clash with professional production views. The inevitable compromises in content and pedagogical technique necessary in such situations frequently results in a program judged to be of poor quality even by the teachers who were involved. The combination of frustration in "involvement" and dissatisfaction with the end-product clearly militates against high utilization, particularly when an objective evaluation system, based on student performance, is not available.

7. ITV utilization has been adversely affected in most school systems by logistical problems associated with the centralized nature of ITV subsystem production, transmission and maintenance and the decentralized nature of program utilization.

a. Centralized program transmission for direct and supplementary teaching purposes, particularly in decentralized school systems, has created severe scheduling problems for school principals. The problem becomes more severe as the number and size of the schools in the system becomes larger, and when only a few transmission channels are available; with an equal number of channels, the problem seems more severe at the secondary level than at the elementary level.

b. Few school systems had adequate back-up equipment of any type, most schools had an inadequate number of outlets and receivers, preventive maintenance procedures rarely were in effect, and emergency maintenance services were unable to respond quickly enough to prevent "lost" instruction in the classroom.

8. Most school principals and classroom teachers did not seem to object to ITV as a medium _per se_, but attributed their reluctance to make greater use of ITV

primarily to one or more of the following factors: poor program quality; equipment unreliability; scheduling difficulties; lack of coordination of program content with classroom instructional aids and other curriculum materials; lack of adequate "release" time for preparation; the apparent conflict of the pedagogical "lecture" technique of most ITV presentations with general educational trends toward decentralized, individualized, self-paced, modular instruction.

9. ITV, when used in system-wide direct and supplementary teaching, is perceived by many principals and classroom teachers to be an invasion of the autonomy and status which they traditionally associate with their roles in the educational organization. In one way or another, ITV is viewed by many as a threat to their professionalism and/or career. These perceptions tend to be strongest: in school systems where ITV operating costs have been budgeted categorically with instructional salaries; at the secondary level more than at the elementary level (specialist vs. generalist dimension); in the richer (comparatively) school systems (in which more highly credentialed specialists are found) than in the poorer school systems.

10. Utilization problems do not occur in isolation in school systems; they are all present and interacting in systemic fashion to some extent within each school system utilizing ITV, although a given problem may be more salient in one place than in another. All school systems reported that the problems accompanying the introduction and utilization of ITV have had a salutory effect; ITV has stimulated re-examination of organizational, curricular, and pedagogical policies and procedures, a process which each

school system felt has been most beneficial. The re-examinations, however, are too often responses to problems frequently attributable to inadequate initial planning.

RECOMMENDATIONS

The following recommendations were made on the basis of this study.

1. Achieving optimal utilization of ITV subsystems in public school systems should be recognized by all concerned as the development phase in a systems approach involving research, development and operational phases.

2. Ultimate economic pay-off of ITV should be expected during the operational phase, but not necessarily during the development phase. Development costs should be considered as an investment to be amortized during the subsequent operational phase, either through a reduced unit cost of instruction per pupil without sacrifice of quality, or through increased quality of pupil learning at an equal, or acceptable increment in, unit cost.

3. ITV should not be considered a priori as suitable for all school systems, or for all curricular areas at all levels within a given school system. The decision to install and utilize an ITV subsystem should be made only in the context of a searching analysis of the school system's educational goals and alternative educational strategies to achieve these goals, with ITV being considered a component subsystem that can be included in various patterns of use, in any one of several strategies to achieve defined, targeted instructional objectives.

4. School systems should be encouraged to shift their internal allocation of resources priority from ITV program production to ITV program utilization. New cooperative efforts among school systems for program production should be explored and encouraged (see 6a. below).

5. ITV should be introduced into a school system only after a development phase has been planned and programmed with adequate resources through time. New "change-agent" mechanisms, centered at the district superintendent organizational level, but with a net to each school in the system, should be considered to facilitate both the adoption and utilization process during development. This sort of mechanism would oversee collection of empirical evidence during development which would "feed-back" into accomplishment of the following tasks:

a. Conducting coordinated in-service training for ITV subsystem staff, classroom teachers, and paraprofessionals, in which a "team" approach to ITV teaching is stressed, with emphasis on freeing the classroom teacher for more, individualized, personal interaction with students.

b. Establishing formal quality-control systems for evaluating classroom-utilization, involving both objective student-learning and teacher-instruction criteria, for use in program validation.

c. Providing adequate physical reception facilities and equipment, and back-up equipment and procedures for preventative, as well as emergency, maintenance services.

d. Projecting deliberately paced time-schedules for introduction of ITV programs into specific courses, curricular areas, and grade levels commensurate with the development resources available. Across-the-board introduction of ITV should be recognized as short-sighted and counter-productive, economically and pedagogically, in the long-run.

6. The Federal Government should be a catalyst for increasing ITV utilization by providing fiscal aid for ITV only to those school systems which conduct the system analysis and incorporate the systems approach to utilization recommended above. Beyond that, the Federal Government can stimulate proper ITV utilization best by focusing its efforts on improving program quality, distribution technological development, and future manpower training.

a. To improve program quality, consideration should be given to: establishment of regional cooperative program production centers, pooling local talent and resources in organizations structurally independent, but functionally coordinated with, participating school systems; stimulation of the private sector to produce ITV programs, much in the manner of textbooks and other instructional materials; modification of existing copyright laws to facilitate "program-sharing."

b. To ease ITV scheduling difficulties in direct and supplementary teaching, stimulate technological development of lower cost videotape recorders and videotape.

c. To create a cadre of teachers trained to utilize ITV to its potential in the future: support the establishment of ITV curriculum concentrations--from production through utilization--in selected teachers colleges and university and college education schools and departments; support establishment of a general course-offering for all education majors in ITV utilization in all teacher preparation institutions.

APPENDIX A

GLOSSARY

GLOSSARY

Administrative Television The use of open or closed-circuit TV for administrative purposes such as for a student orientation program, for the administration of standardized tests, for district-planned in-service education, and classroom observation.

Aspect Ratio The relationship of the dimensions of a visual aid, such as the relationship of height (six units of measurement) to the width (four units of measurement).

Audio The sound portion of a television presentation.

Behavioral Objective An explicitly stated learner-behavior that is observable, obtainable and measurable within the instructional context.

Bicycle The transporting between stations of taped programs by various means (e.g., bus, plane).

Camera Chain The TV camera with its control unit, monitor, power supply and connecting cables.

Channel The frequency assigned to a specific closed-circuit modulator or to a television transmitter.

Clearance The granting of permission to use copyrighted materials.

Closed Circuit Television The private reception of televised programs, transmitted via cable or microwave, that is limited to certain receivers included in the circuit.

Coaxial Cable   A cable with a concentric inner conductor and a surrounding outer shield which reduces transmission loss of video and radio frequency signals.

Commercial Television   The broadcasts of stations that are privately operated and seek profit. The programming is characterized by a mixture of entertainment, advertising and public interest programs.

Community Antenna Television (CATV)   An antenna-distribution system that has the capacity to recieve, amplify and distribute broadcast signals via cable or wire to TV receivers.

Community Television Station   A nonprofit station which is supported through public subscription and which sells daily TV time, at cost, to educational institutions. For FCC licensing purposes, this falls under the category of an "educational station."

Control Room   A studio containing various facilities with which the director, the producer and the technicians can control the transmission, the selection, lighting and shading of a picture.

Dial Access   In the layman's sense, it refers to an automated retrieval system whereby the dialer (the viewer and/or listener) controls the selection of program presentation. In the technical sense it involves three aspects: the dialer's signaling a request to the control room for a specific program at a specific (reception) location; the selection of a channel among various channels in operation using a dial and a dial code (the letter representing designated programs as they might be indexed in a program directory); and the initiation upon request of a videotape recorder when the channel is in operation.

Direct Television Teaching The major portion of a course is presented by a master teacher through television with supplementation by individual study and directed small-group discussions.

Distribution Facility An antenna-receiver system for one or several buildings with signals transmitted from the antenna to the receiver via coaxial cable.

Educational Television A broad term typically applied to community broadcasts that are considered qualitatively educational and are not used primarily for entertainment. Such programs may be used in schools. More technically, it is the utilization, not the content of a program, which determines its being educational or not.

Educational Television Station A station owned and operated by an educational institution or a school district for educational purposes and not for profit. Under FCC regulations, any nonprofit TV station is considered "educational."

EIA (RETMA) Standards The Electronics Industry Association (EIA), formerly known as RETMA, created research committees to establish criteria and standards for commercial broadcasting equipment. All transmitting and receiving equipment used in conventional telecasting must meet these requirements.

Film Chain An arrangement of one or more projectors (typically 16-mm. film and/or 25-mm. slides) for image pickup by a TV camera.

Film Clips Inserted sequences, usually short, of motion picture film in a TV presentation.

Film Strips Individually shown sequence of 35-mm. films.

Floor Manager A member of the production staff in the studio room who relays cues from the director in the control room to the technical staff and performers.

Instructional Television (ITV) Programs designated and produced for instructional purposes which may have a teacher "in" the actual audio-visual presentation or connected with it in utilization. There are three types of ITV according to the kind of utilization: total, direct and support.

Instructional Television Fixed Service (ITFS) Also called the 2500 megaHertz system. In 1963 the FCC opened up 31 channels in the 2500 - 2690 megaHertz frequency range for use by educational institutions and organizations. Its primary use is for formal, in-class instruction and secondarily for administrative purposes of the licensee.

Kinescope Recording A film of a television broadcast recorded directly from the face of the viewing tube.

Literary Rights A copyright of an author or publisher on printed material which prohibits its use by others without obtaining written permission from the copyright holder.

Live In contrast to a video recording or a film, it refers to the transmitting from a studio a program so that the viewer or listener sees or hears what is presently occurring in the studio.

Live Talent Live or animated subjects used in a TV presentation.

Master Antenna System A single antenna-distribution system that preempts the need for individual antennae for each receiver.

MegaHertz (Megacycle) A frequency of 1,000,000 cycles per second of electromagnetic waves used for radio and TV broadcasting.

Microwave (Link) The point-to-point directional transmission of audio and video signals for distances of up to 50 miles. A single link consists of a special high-frequency transmitter and a receiver.

Monitor A receiver used in the control and studio rooms for showing on-going programs. It may also refer to an equipment unit which displays on a picture tube the images detected and transmitted by a TV camera.

National Association of Educational Broadcasters (NAEB) An organization which represents people involved in the use, distribution and production of ETV or ITV.

National Educational Television (NET) A producer-distributor of nationwide ETV programs.

Network A system of interconnected radio or television stations which can simultaneously broadcast a single program.

Open Circuit Television (Broadcast) A program transmitted from a TV station for reception by the general public.

Package A ready-to-use program or series, usually a tape or film, available for purchase.

Pan A slow movement of a camera.

Play-Back The monitoring of a tape or disc immediately after it is made.

Potential Audience The total number of people or homes in a particular area with receiving sets.

Producer A staff member involved in all phases of telecasting and charged with the ultimate responsibility for its value and success.

Production A general term that refers to the creation, organization and telecasting of a TV presentation.

Rear Projection The presentation of films or slides onto a translucent screen while a camera is "picking-up" the image on the opposite side of the screen. This arrangement enables the instructor to be in front of the projected screen and eliminates lighting difficulties associated with front projectors.

Release Time The time, typically used for regular teacher duties, which has been made available for other activities such as evaluating innovations in instruction.

Remote Unit A mobile TV and audio facility used to pick up and transmit events outside a studio.

Residuals The fee paid to talent for filmed or taped programs upon re-broadcast.

Script A written copy of the video and audio portions as well as the directions for television presentation.

Service Area The region in which a broadcast station's transmission can be satisfactorily received.

Single-Room Television The use of TV with the camera chain outside the room. This TV use is also termed Mirror Television as it permits the performer to watch his own performance.

Source The place of origin of transmission of a TV or radio program.

Studio Teacher The teacher who presents the instruction on the TV.

Supplementary or Support Television The presentation of scheduled TV programs used to augment the classroom offerings. This utilization pattern, which is frequently found, may be used to encourage discussion, to clarify previous subject matter or present new material. It is essentially a labor-saving device which increases the teachers' resources.

Talent The studio teacher or any other performer present before the camera.

Talk-Back A two-way voice communication system such as a telephone or intercom. This system, for example, used in conjunction with the administering of standardized tests, enables an exam proctor in the testing room to communicate with and receive directions from the test administrator in the studio room.

Talking Face A person (e.g., a studio teacher) lecturing into a TV camera.

Team Teaching An arrangement for instructional purposes in which two or more cooperating teachers are given joint responsibility for a major portion of the instruction.

Telelesson A televised instructional lesson.

Television as Enrichment The scheduling of TV presentations which are not a part of the basic curriculum. Though such programs do not function as specific curricular units they are regarded as valuable in the context of the course material.

Test Pattern A chart, composed of various combinations of lines and geometric shapes, used for checking overall performance of a TV system.

Total Teaching by Television The teaching of a course is done entirely through the televised presentation.

Traffic The scheduling of programs and commercials, as well as the routing of scheduled information to relevant personnel.

Ultra-High Frequency (UHF) A frequency of 300 to 3,000 megacycles per second, used for Channels 14 - 83.

Very-High Frequency (VHF) A frequency of 30 to 300 megacycles per second, used for Channels 2 - 13.

Video The visual portion of a TV presentation.

Video-Tape Recorder (VTR) A device with a magnetic tape which records the audio and visual portions of a TV production, permitting a replay of the presentation at some later date.

Visuals Charts, outlines, models, etc., used in or connected with a TV presentation.

Voice-Over (VO) The off-camera reading of some portion of the script while the visual material is shown.

APPENDIX B

ANNOTATED BIBLIOGRAPHY

INDEX TO ANNOTATED BIBLIOGRAPHY

List of Index Headings*

1. Educational Organization(s)
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5. Innovation in Education, Systemic Approach
6. Innovation in Education, Systemic Effects
7. Innovation in Education, Theoretical Treatment
8. Innovator(s) in Education, Characteristics
9. Predictions, Role of New Media in Education
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11. Recommendations
12. Research, Role in Educational Innovation
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17. Teacher, Role in Educational Innovation
18. Television in Education

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* The annotations, beginning on page B-11, are arranged in alphabetical order by author.

1. Educational Organization(s), especially as affecting educational innovation.

    Bessent & Moore (1967)
    Biddle & Rossi (1966)
    Brown & House (1967)
    Carlson (1965)
    Eichholz & Rogers (1964)
    Evans (1968)
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    Jung, *et al*. (1967)
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    McCusker & Sorenson (1966)
    McKean (1965)
    Miles (1967, 1966, 1964a, b)
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2. Educational System, Economic Character, especially as affecting and related to innovation.

    Biddle & Rossi (1966)
    Carlson (1965)
    Flesche, *et al*. (1964)
    Goldhammer, *et al*. (1967)
    Eichholz & Rogers (1964)
    Janowitz & Street (1966)
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2. Educational System(s), Economic Character (continued)

- Marsh (1964)
- Miles (1967)
- Trow (1966)
- Wigren (1967)

3. Foundations, Role in Educational Innovation

- Bessent & Moore (1967)
- Colvard (1966)
- Marsh (1964)
- Pellegrin (1966)

4. Innovation in Education, Case Studies

- Atwood (1963)
- Buchanan (1967)
- Colvard (1964)
- Cronin (1968)
- Diamond (1964)
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- Morison (1950)
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Miles & Lake (1967)
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Miles (1966, 1964a)
Miller (1967a)
Zander (1950)

8. Innovator(s) in Education, Characteristics; advocate of change, characteristics.

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Rogers (1966, 1963)

9. Predictions, Role of New Media in Education; projections of present trends or anticipation of new trends relating to effects and role of new media in education.

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10. Principal, Role in Educational Innovation

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11. Recommendations; guidelines, principles, etc., to facilitate the initiation and implementation of educational innovation.

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- Allen (1967)
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- Caffery (1965)
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- Mann (1967)
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- Miles & Lake (1967)
- Pellegrin (1966)
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12. Research, Role in Educational Innovation

- Adelson (1965)
- Becker (1968)
- Cogen (1965)
- Horvat (1968)
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13. Resistance(s); generic and specific, factors affecting acceptance of educational innovation.

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- Atwood (1963)
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- Bradford (1958)
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- Cartwright (1950)
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- Goldhammer (1965)
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Stuit & Becker (1967)
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14. School Board, Role in Educational Innovation

Pellegrin (1966, 1965)

15. State Education Departments, Role in Educational Innovation

Gibboney (1967)
Pellegrin (1960)

16. Superintendent, Role in Educational Innovation

Bessent & Moore (1967)
Caffery (1965)
Carlson (1967)
Erickson (1967)
Goldhammer, *et al*. (1967)
Johnson, *et al*. (1968)
Miles (1964b)
Pellegrin (1966)
Rogers (1966, 1963)

17. Teacher, Role in Educational Innovation

Allen (1967)
Campbell (1968)
Chapman (1968)
Cogen (1965)
Holmes (1968)
LeFevre (1967)
Lippitt & Colleagues (1967)
Miles (1964b)
Miller (1967a)
Pellegrin (1966)

18. Television in Education; ETV, ITV, CCTV, attitudes towards, acceptance of and utilization aspects.

Becker (1958)
Biddle & Rossi (1966)
Chu & Schramm (1967)
Diamond (1964)
Dyer-Bennett (1958)
Evans (1968, 1962, 1955)
Gaylord (n.d.)
Janowitz & Street (1966)
McKeachie (1966)
Macomber & Siegel (1960)
May (1966, 1965)
Siegel & Siegel (1966)
Stuit & Becker (1957)
Trow (1966)
Wigren (1967)

Adelson, M. 1965. Educational ends and innovational means. Paper presented at the Institute of Government and Public Affairs Conference on Educational Innovations, U.C.L.A. Lake Arrowhead Conference Center, December 17-20.

Innovations, according to Adelson, are not being assessed in terms of educational goals. Innovation may absorb a disproportionate amount of system resources, making subsequent change difficult. Innovations may also be mutually exclusive. Adelson recommends the creation of research laboratories, the establishment of an institution which would consider the long-term social impact associated with particular innovations, and the setting up of a means of pooling resources in the educational community.

Allen, D.W. 1967. A differentiated staff: putting teaching talent to work. Washington, D.C.: National Commission on Teacher Education and Professional Standards, National Education Association.

Ignoring individual differences in teacher-ability produces ineffectiveness and inefficiency. A differentiated staff structure is recommended. This structure would include non-teaching positions and would be functionally open-ended. Teachers would experiment when responsibility is commensurate with competence. The proposed staff structure would generate an efficient use of personnel on the basis of demonstrated ability.

Alexander, W.M. 1967. The acceleration of curriculum change. In Miller, R.I. (ed.), Perspectives on educational change. New York: Holt, Rinehart & Winston. pp. 341-359.

Acceleration of curriculum change, the main problem of the 1960's, is occurring neither widely enough nor wisely. A tentative outline of a model of curriculum change is offered based on the identification of curriculum needs, the determination of curriculum priorities, the selection of the innovation, the tryout and the diffusion. Several suggestions are made with regard to facilitating the implementation of curricular change.

Atwood, M.S. 1963. Small-scale administrative change: resistance to the introduction of a high school guidance program. In Miles, M.B. (ed.), *Innovation in education*. New York: Bureau of Publications, Teachers College, Columbia University. pp. 49-78.

A case study of the change process, its consequences and especially its resistances, is examined in terms of anthropological interaction theory. Faculty members associated with a school for some period of time resisted the disruption of their interaction patterns which the innovation warranted. The newcomers did not resist the program as they did not develop stable patterns of interaction.

Becker, S.L. 1968. Instructional television: what we do and do not know. *Proceedings of the 18th Annual Summer Speech Conference*, Ann Arbor, University of Michigan. pp. 23-33.

Becker found in his Iowa State University study that the crucial variable in pupil acceptance of ITV was not the medium *per se*, but whether or not a discussion session was included with its use. Faculty acceptance of ITV is a necessary condition for its success. When the medium was used, even skeptical teachers became enthusiastic supporters of ITV. A need was noted for research on media in terms of criteria such as students' acquiring a sense of values, learning to learn and learning to think critically.

Bennis, W.G. 1962. A typology of change processes. In Bennis, W.G., Benne, K.D. and Chin, R. (eds.), The planning of change. New York: Holt, Rinehart & Winston. pp. 154-156.

A taxonomic paradigm of change processes is offered, based on the dimensions of mutuality of goal setting, ratio of power and deliberateness of parties involved. The eight types of change isolated are: planned, indoctrination, coercive, technocratic, interactional, socialization, emulative and natural.

Bessent, W. and Moore, Hollis A. 1967. The effect of outside funds on school districts. In Miller, R.I. (ed.), Perspectives on educational change. New York: Appleton-Century-Crofts. pp. 101-119.

Educational organizations are preoccupied with control processes rather than change processes. Introducing an innovation throughout the system or via temporary structures entails, respectively, the problems of built-in resistance and linkage. An innovative project inhibits freedom to experiment by its restrictions and by its pre-determined outcomes. Foundations should support free-searching innovative endeavors rather than try exclusively to demonstrate specific programs.

Biddle, B.J. and Rossi, P.H. 1966. Educational media, education and society. In Rossi, P.H. and Biddle, B.J. (eds.) The new media and education. Chicago: Aldine Publishing Co. pp. 2-48.

The implementation of innovative media entails solving complex problems of social behavior, and the differentiation of positions and roles. Adoption of media is a function of the characteristics of American education and of the media themselves. Media have primarily been used adjunctively. New media are most aptly used to provide information rather than to facilitate socialization or mobilization (see Janowitz and Street, 1966). The authors predict "token acceptance" of media, further division between the rich and the poor schools, the alteration of the concept of school, and the absence of significant savings in the cost of education.

Bradford, L.P. 1958. The teaching-learning transaction. In Bennis, W.G., Benne, K.D. and Chin, R. (eds.), The planning of change. New York: Holt, Rinehart & Winston, 1962. pp. 493-502.

Two assumptions are basic to the effective learning process: first, teaching should be regarded as essentially human-relational; second, the target of education should be broader than cognitive learning. What the student and teacher bring into the transaction (e.g., expectations and awareness) affects the learning process. The teacher needs to be aware of the consequences of interaction on members of the learning group and on the group as a whole. Overcoming the learner's resistances to change requires a diagnosis of these forces and the fostering of internal and external support.

Brickell, H.M. 1967. The role of local school systems in change. In Miller, R.I. (ed.), Perspectives on educational change. New York: Appleton- Century-Crofts. pp. 76-100.

A rather complete and detailed model of the functions involved in educational change is presented. The elements of the model elaborated are the social goal context and the operation and generation of instructional programs.

Brown, A.F. and House, J.H. 1967. The organizational component in education. Review of Educational Research: Educational Organization, Administration and Finance, 36. pp. 399-416.

A good review is given of research on the organizational features of education. Organizational climate is discussed in terms of a variety of variables including organizational cohesion, the principal, and academic achievement. Both dimensional and case studies of educational bureaucracy are cited. Among other topics are organizational change, communication and decision-making.

Buchanan, P.C. 1967. The concept of organizational development or self-renewal, as a form of planned change. In Watson, G. (ed.), Concepts for social change. Washington, D.C.: National Training Laboratories, National Education Association. pp. 1-9.

Organizational development, with its problem-solving orientation, is a type of planned change based on collaborative effort. The main objective is to assist organizations in attaining a state of self-renewal. Exemplary processes used in this strategy include team development, review of current practices and philosophies of the organization, and reassessing and modifying diagnoses and goals.

Buchanan, P.C. 1967. Crucial issues in organizational development. In Watson, G. (ed.), Changing school systems. Washington, D.C.: National Training Laboratories, National Education Association. pp. 51-67.

Successful cases of organizational development are characterized by the institutionalization of a model of change rather than the use of any particular model, the involvement of all levels of management and the presence of an outside change agent. The models that were used produced changes in the power structure,resulting in shifts from authoritarian to distributed influence, increases in influence at lower levels and increases in self-control of the organization. Successful models also emphasized the development of norms and skills which facilitate the transition from relationships based on negotiation to relationships based on collaboration.

Caffery, J.G. 1965. Innovational matrix. Paper presented at the Institute of Government and Public Affairs Conference on Educational Innovations, U.C.L.A. Lake Arrowhead Conference Center, December 17-20.

Acceptance of innovation is a function of the need to adapt to a new environment, the absence of counter-tradition, extrinsic incentives, pressure from respected leadership, the removal of old tools, freedom and intrinsic incentives to experiment, sufficient resources, institutional membership which includes innovators and users, and political protection for the innovator.

The superintendent's ambition and autonomy are more important than fiscal factors in innovation. New institutional arrangements need to be established in order to avoid by-passing innovation in poor school districts.

Campbell, W.J. 1968. Introduction. Paper presented at 40th Congress of the Australian and New Zealand Association for the Advancement of Science, Christchurch, New Zealand, January.

Campbell discusses a comparative study of English-speaking countries with regard to teacher roles (see Adams, 1968; Biddle, 1968; Fraser, 1968; Holmes, 1968). The literature on teaching and teachers is meager; in part, this is due to the belief that teaching is merely a facet of learning or inferable from it. Gage (1964) is cited to support the view that a knowledge of teaching does not directly follow from a knowledge of learning.

Carlson, R.O. 1967. Adoption of educational innovations. Eugene, Oregon, The Center for the Advanced Study of Educational Administration, University of Oregon.

The rate of acceptance of an innovation is assumed to depend on the characteristics of the adopting unit, the way in which the unit is joined to information and communication channels, and the position the unit has in the social structure. Diffusion of innovation is postulated as a chain reaction process rather than an individual process. The superintendent is at a focal point in the decision-making process with regard to change. The findings of Carlson's study of innovative superintendents are reported.

Carlson, R.O. 1965. Barriers to change in public schools. In Carlson, R.O. and Goldhammer, K. (eds.), Change processes in the public schools. Eugene, Oregon, The Center for the Advanced Study of Educational Administration, University of Oregon. pp. 3-10.

The barriers to change mentioned are the absence of an institutionalized change agent, a limited knowledge base and "domestication" of the school. Domestication refers to the protection of the school from the society which it serves, that is, the belief that schools should not have to compete with other institutions to survive.

Cartwright, C. 1950. Achieving change in people. In Bennis, W.G., Benne, R.D. and Chin, R. (eds.), The planning of change. New York: Holt Rinehart & Winston, 1962. pp. 698-706.

Attempts to change must deal with the dynamics of the target group. Various principles of the relationship of change to group dynamics are outlined. The more attractive a group is to its members, the greater the former's influence on its members. Prestige is correlated with potential influence. Changing individuals or sub-parts of a group will make the changees deviant from the norms, generating resistance. Creating a shared perception of the need for change makes change easier to implement.

Chapman, R.E. 1968. Training the innovative agent. Paper presented at the Annual Meeting of the American Educational Research Association, Chicago, February 7-10.

A procedure for curriculum development based on feedback and measurement is proposed. Objectives are explicitly stated and the course is revised until it succeeds. This method provides empirical validation of curricula and greater efficiency in instructional design.

Chesler, M., Smuck, R. and Lippitt, R. 1962. The principal's role in facilitating innovation. Theory into practice, 2, pp. 269-277.

Chesler *et al*. report the initial findings of an investigation of the development and sharing of innovative classroom practices. A correlation was found between staff inventiveness and the staff's perception of the principal's support for innovation in teaching. The principal also had an indirect role in providing a teacher-peer group climate that was conducive to change.

Chin, R. 1967. Some ideas on changing. In Miller, R.I. (ed.) Perspectives on educational change. New York: Appleton-Century-Crofts. pp. 325-340.

The current state of theorizing about change characteristically cites the svstemic complexity involved in technological innovation, the development of roles in institutions for fostering and implementing change, and the rapid rate of obsolescence of knowledge and technology. Several principles for approaching the problems of innovation are offered. The change strategies of direct education, use of specialists, innovation and diffusion, communication, use of media, induction through money, and planned change are discussed. Several levels of change are cited: substitution, alteration, preservation and variation, restructuring and value-orientation change. Organic system, component system, intersystem and developmental models of change are overviewed.

Chin, R. 1962. The utility of system models and developmental models for practitioners. In Bennis, W.G., Benne, K.D. and Chin, R. (eds.), The planning of change. New York: Holt, Rinehart & Winston, pp. 201-217.

A system model treats phenomena in terms of an organization characterized by interdependency and integration. The source of change is structural, or is induced by the external environment. Components of this type of model include roles, acts, expectations, power relationships, etc. An intersystem model employs two reciprocal open systems. The developmental model is based on a progression of change toward some goal or state. A model of changing is presented which focuses on the induced forces producing change.

Chu, G.C. and Schramm, W. 1967. Learning from television: what the research says. Final report OE Contract 2 efc-708-94. Stanford, California, Stanford University.

A survey of the research literature on the effectiveness of TV learning is given. Six aspects of the problem are discussed: amount learned; efficiency of use in school; treatment, situation and pupil variables; attitudes; TV in developing regions; and comparative learning outcomes with other media. Chu and Schramm conclude that TV can be an efficient medium for learning and teaching. Failures are largely due to inappropriate utilization. Evidence indicates support for the integration of TV into other instruction modes, simple over "fancy" presentations, introducing the medium so as to minimize resistance, and the evaluating and revising of ITV programs.

Cogen, C. 1965. The teacher as an agent for educational change. Paper presented at Institute of Government and Public Affairs Conference on Educational Innovations, U.C.L.A. Lake Arrowhead Conference Center, December 17-20.

The teacher can and has proven to be innovative. However, it is difficult for the single teacher to effect far-reaching changes. In order to overcome the barriers of the existing hierarchy, Cogen recommends the creation of new power arrangements for the teacher and the development of institutional projects (e.g., PSSC). Collective bargaining has the added advantage of setting up a continuing consultation process between the teacher and the board of education. Innovation should be weighed with regard to the roots of the present practices and as to the possible effects on the roles and values of those involved. Implementing educational change requires the elevation of teacher professionalization, increases in in-service training programs and the extension of released time. Teacher resistance can be curtailed somewhat if innovations are properly evaluated. Slowing down the rate of innovation adoption is possibly warranted.

Colvard, R. 1964. The colleges and the "Arkansas Purchase" controversy. In Miles, M.B. (ed.), *Innovation in education*. New York: Bureau of Publications, Teachers College, Columbia University. pp. 117-155.

The "Arkansas Purchase" episode is discussed to emphasize the necessity of considering the professional, the political and the economic contexts involved in innovation. The Ford Foundation offered to finance the transformation of a teacher education program. This proposal, however, was attenuated by the issues of educational legitimacy, organizational autonomy, and economic security. The final program accepted by all parties was essentially a compromise. For an interesting comparison see Flesche's (1964) article.

Cronin, J.M. 1968. Open door academy. Paper presented at the Annual Meeting of the American Educational Research Association, Chicago, February 7-10.

The case study of a Catholic high school is examined in terms of its adaptations and interactions with its environment. Because of low enrollment, admission standards were lowered. To retain students, the curriculum was liberalized. A non-selected clientele requires adaptability because the school is in a reacting rather than an initiating position. The author suggests that there is a life cycle for private schools, where aspiration for selective admissions is modified to an unselective policy and then with a large student body there is a return to selective control.

Diamond, R.M. 1964. A guide to instructional television. New York: McGraw-Hill.

This important volume provides an anthology of case studies, evaluations, suggestions and analyses. The articles are arranged under the headings of single-room television, studio television, administrative uses, perspectives on ITV and guidelines for introducing and evaluating ITV. The book is suggested reading for those who desire a grasp of both the technical and the non-technical aspects of ITV, its utilization, implementation, prospects and problems.

Dyer-Bennett, J.; Fuller, W.R.; Seibert, W.F. and Shanks, M.W. 1958. Teaching Calculus by closed-circuit television. *The American Mathematical Monthly*, 65. pp. 430-439.

A comparison between ITV and conventional calculus instruction revealed no differences in student achievement. Exposure to ITV was found to be associated with an increase in negative reactions toward ITV. A large majority of the students in the conventional and ITV courses said that TV does not instruct as well as the lecture. Demonstrations via TV, however, were more acceptable. Students generally felt that the lack of discussion was a serious limitation to ITV.

Edling, J.V. 1968. Educational objectives and educational media. *Review of Educational Research: Instructional Materials: Educational Media and Technology*, 38. pp. 177-194.

There is little clearcut evidence that supports or rejects the view that the new media will produce better learning than other instructional modes. The development of media has contributed to education in several ways, namely, in the clarification of educational objectives, in the utilization of learner responses to refine and develop more predictable learning experiences, in the clarification of the need for specific instructional strategies, and the provision of a methodology to determine attainment of specific objectives.

Eichholz, G.C. 1961. Why do teachers reject change? *Theory into practice*, 2. pp. 264-268.

A theory of rejection is advanced that parallels the stages of innovation. The forms of rejection postulated include ignorance, suspended judgment, situational, personal and experimental. Various suggestions are given for circumventing or minimizing each of these forms of resistance. The dual process of rejection-acceptance is said to generate the effective channeling of change.

Eichholz, G. and Rogers, E.M. 1964. Resistance to the adoption of audio-visual aids by elementary school teachers: contrasts and similarities to agricultural innovation. In Miles, M.B. (ed.), _Innovation in education_. New York: Bureau of Publications, Teachers College, Columbia University, pp. 299-317.

Major diffusion research traditions of anthropology, early sociology, rural sociology, education, industrial and medical sociology are discussed. Five stages of innovation were cited: awareness, interest, evaluation, trial and adoption. The authors offer a rejection theory and a typology of rejection forms which includes ignorance, suspended judgment, situational, personal and experimental. Innovativeness was found to vary with cosmopolitism and the financial resources of a community. Diffusion of innovation in education is comparatively slow because of the absence of change agents, the absence of scientific sources of innovation and the lack of economic incentives to change.

Erickson, D.A. 1967. The school administrator. _Review of Educational Research; Educational Organization, Administration and Finance_, 36, pp. 417-432.

A good review of the literature (speculative and experimental) on the school administrator is given. Though the research in the area is characteristically unsophisticated and not cumulative, a coterie of scholars is emerging (Griffits, Hemphill, Halpin, Campbell, Getzels, etc.). The most fruitful work comes from the researcher-theorist who, while eschewing simplistic models, is refining interpretations and methodology.

Evans, R.I. 1968. Resistance to innovation in higher education. San Francisco: Jossey-Bass.

Resistance to change is to be expected in educational settings as education has the primary function of perpetuating the folkways, the mores and the values of society. Evidence indicates that change in education lacks planning, integration and especially evaluation. The acceptance of innovation depends upon the innovation itself, the innovative process, the characteristics of the adopting unit, and the nature of the social system involved.

Evans reports on his case history of a university's response to ITV: the overall faculty reaction was negative. Pro-ITV faculty were more cosmopolitan than anti-ITV faculty. Reasons for discontinuance of ITV included the stated absence of need, the termination of funds and the belief that face-to-face contact is optimal for learning. ITV was more acceptable if viewed as an adjunct rather than as a radical departure from present practices.

Evans, R.I.; Smith, R.G. and Coleville, W.K. 1962. The university faculty and educational television: hostility, resistance and change. Houston: University of Houston.

Pro-ITV professors indicated that they were less ivory tower, more variable in teaching and evaluation techniques, more interested in research and less preoccupied with economic rewards. Faculty members in an anti-ITV department showed a markedly favorable attitude toward ITV after participating in videotape activities.

Evans, R. I.; Roney, M.B. and McAdams, W.J. 1955. The evaluation of the effectiveness of instruction and audience reaction to programming on an educational television station. _Journal of Applied Psychology_, 39, pp. 277-279.

No difference was found in achievement between students in conventional and ITV courses. The preferred TV programs were sports, educational films, panel discussions and children's programs. Several programs developed small but loyal audiences. Evans cites an earlier study which found that TV students favored the blackboard technique over the extensive use of visual aids.

Flesche, D.C.; Masters, N.A. and Eliot, T.H. 1964. The Illinois School Problems Commission: An innovation in decision-making at the state level. In Miles, M.B. (ed.), _Innovation in education_. New York: Bureau of Publications, Teachers College, Columbia University. pp. 183-201.

The Illinois School Problems Commission represents a combination of the goals of education with a recognition of the realities of the political system. Members of the Commission regard their primary interests as involving stability, moderation and not innovation _per se_. Their success is largely due to the obtaining of a concensus. The political institutionalization basic to this Commission may be taken as a useful approach to implementing change at local district levels.

Gallaher, A., Jr. 1966. Directed change in formal organizations: The school system. In Carlson, R.O. and Goldhammer, K. (eds.). Change processes in the public schools. Eugene, Oregon: The Center for the Advanced Study of Educational Administration, University of Oregon. pp. 37-51.

The advocate of change is distinguished from the innovator. A pragmatic advocate model is based on the acceptance process. A utopic model is premised on the acceptance act. Factors that affect adoption of innovation include expectations of potential users, and the role of authority in its dispensing of rewards and sanctions. Gallaher recommends an educational extension institution which would emphasize research programs for creating alternatives and the training of change agents.

Geis, G.L. 1968. Developing a strategy for innovation. Paper presented at the Annual Meeting of the American Educational Research Association, Chicago, February 7-10.

A review of the literature on innovation reveals that many innovations fall into disuse and that sustained innovations are rarely evaluated. Innovations usually originate outside the school system and are typically imposed without adequate preparation of the target system.

The Foreign Language Curriculum Study project is discussed in terms of training innovative agents, making the school a generator rather than a mere recipient of change.

Gibboney, R.A. 1967. The role of the state educational department in educational change. In Miller, R.I. (ed.), Perspectives on educational change. New York: Appleton-Century-Crofts. pp. 118-147.

The research literature on change, and specifically on the role of state education departments, is sparse. Many state education departments, however, are assuming leadership in curriculum research, teacher education, implementation of new Federal programs, and vocational-technical education. Exemplary DPI innovations in Pennsylvania are discussed, including area curriculum centers and an elementary and secondary library program. A theory of the role of state education departments relating to change is presented.

Goldhammer, K.; Suttle, J.; Aldridge, W.D. and Becker, G.L. 1967. Issues and problems in contemporary educational administration. Eugene, Oregon: The Center for the Advanced Study of Educational Administration, University of Oregon.

Contemporary training of educational administrators emphasizes the importance of administrative theory, the application of behavioral sciences and the analysis of the school organization. Six problem areas confronting the superintendent were discussed: educational change, teacher militancy, instruction, administrative leadership, critical social issues and finance. Ingredients of a strategy for coping with the superintendents' problems are elaborated.

Goldhammer, K. 1965. Factors related to citizen, administrator and teacher participation in educational decision-making. Symposium presented at the meeting of the American Educational Research Association, Chicago, February 12.

Local educational decision-making is said to be a political process involving the interactions, values, interests and aspirations of non-school citizens who are officials in the school organization, school administrators, and teachers. The instability in educational affairs is seen as a result of the lack of involvement of generally influential citizens in education.

Goldhammer, K. 1965a. Issues and strategies in the public acceptance of educational change. Paper presented at the Conference on Educational Issues in a Changing World, Kaanapali Beach, Maui, Hawaii, November 18.

The school is not a closed or independent social system but rather is embedded in the larger social system. The public's acceptance of an innovation is discussed in terms of the image of the change advocate, the image of the organization, the image of the proposed change, the organization objectives, the congruence of the change with societal needs and values, and facilitative and inhibitory situational factors.

Griffiths, D.E. 1963. The elementary school principal and change in the school system. Theory into Practice, 2 pp. 278-284.

Griffiths discusses the findings of a study of administrative performance of elementary school principals. The tendency for principals to recommend change is found to be related to their compliance with suggestions and their indifference to superiors and outsiders. The position of the principal was interpreted as being three steps from the hierarchical apogee. Thus, it is concluded that the principal cannot be relied upon to initiate change.

Havelock, R.D. and Benne, K.D. 1967. An exploratory study of knowledge utilization. In Watson, G. (ed.), *Concepts for social change*. Washington, D.C.: National Training Laboratories, National Education Association. pp. 47-70.

Though there is a growing quantity of relevant new knowledge for education, there are no formal channels through which it can flow to potential users. A systems and process analysis of knowledge utilization is discussed. The administrative backups to utilization involve the substructures of finance, education, control, production and change. A complete utilization chain is a need-fulfillment cycle which includes consumer feedback.

Heathers, G. 1967. Influencing change at the elementary level. In Miller, R.I. (ed.), *Perspectives on educational change*. New York: Appleton-Century-Crofts. pp. 21-53.

More sweeping changes are being directed at the elementary level than at any other. The current reform movement in education is characterized by a redefinition of education and by a multitude of innovations. Innovations are often designed without a clear relation to any educational aim. The strategies used in developing and diffusing innovations are likewise inadequate. Heathers suggests using a research-development strategy with its task analysis, design development, testing, and dissemination stages. Increasing the professionalism of school personnel is also recommended for meeting the challenge of educational reform.

Heck, T.B. 1968. Procedures for statewide studies of educational change. Paper presented at the Annual Meeting of the American Educational Research Association, Chicago, February 7 - 10.

A descriptive analysis is presented of the studies on educational change in Kentucky, Ohio, New York and Washington. The objectives of these studies are summarized as encouraging innovation via cross-fertilization, developing base-line data about educational change, generating guides for future studies and suggesting strategies for implementation of change. The weaknesses of the studies include inadequate sampling of educational changes, inconsistent quality of respondents, and a focus on historical description rather than one on providing information for an implementation strategy.

Holmes, R. 1968. Attitudes of teachers. Paper presented at 40th Congress of the Australian and New Zealand Association for the Advancement of Science, Christchurch, New Zealand, January.

Generally, teachers were found to be satisfied with their jobs. U.S. teachers were more satisfied than the Australians, who were more satisfied than the English who were, in turn, more satisfied than the New Zealanders. A higher proportion of teachers in Australia and New Zealand than elsewhere hoped to leave the profession altogether. Few U.S. teachers anticipated becoming headmasters or school officials. The author cautions against attributing findings to the specific countries before sample variables are extensively analyzed.

Horvat, J.J. 1968. The role of educational research in educational change in the United States - synthesis. Symposium presented at the Annual Meeting of the American Educational Research Association, Chicago, February 10.

Educational decisions usually have been made without the benefit of research insights. Research in education has neglected field problems, limited itself to few methods and has failed to produce a programmatic or cumulative perspective. Horvat recommends the creation of new middlemen to provide a link for knowledge utilization.

Janowitz, M. and Street, D. 1966. The social organization of education. In Rossi, P.M. and Biddle, B.J. (eds.), *The new media and education*. Chicago: Aldine Publishing Company. pp. 207-242.

New media in education involve a "social process in which there is high expertise, a powerful resource base, and an oligarchy on the part of the producers and low expertise, high dependence, weak resources and a lack of organization on the part of the users (p. 242)."

Appropriate attention to the sociological or organizational setting of the media in education could help to generate an education which is individualized and pluralized rather than rigid and standardized.

Johnson, A.M.; Carnie, G.H. and Lawrence, C.J. 1968. Personality characteristics of school superintendents in relation to their willingness to accept innovation in education. Paper presented at the Annual Meeting of the American Educational Research Association, Chicago, February 7-10.

Several studies are cited which indicate that high-level administrators, especially superintendents, are crucial in the initiation and acceptance of innovation. In the Johnson *et al*. study, innovative superintendents were found to be more outgoing, more assertive, more adventuresome, more imaginative and more experimental than non-innovative superintendents. These findings were taken to imply the need for encouraging the above cited traits in administrators via training.

Jung, C.C. 1967. The trainer change-agent role within a school system. In Watson, G. (ed.) *Changing school systems*. Washington, D.C.: National Training Laboratories, National Education Association. pp. 68-105.

Jung emphasizes the utility of creating the role of *trainer* change-agent within the school system. The trainer would deal primarily with change, its planning, implementation, evaluation and modification. The position would entail upper administrative responsibility, autonomy and active lines of communication throughout the system. For interesting comparisons see Gallaher's (1966) concept of advocate and Klein's (1967) defender.

Jung, C.C., Fox, R. and Lippitt, R. 1967. An orientation and strategy for working on problems of change in school systems. In Watson, G. (ed.), *Changing school systems*. Washington, D.C.: National Training Laboratory, National Education Association. pp. 68-88.

There are five levels of the school structure which condition the learning experience: the pupil, the classroom peer group, the direct workers (e.g., teachers), those who directly facilitate or inhibit efforts of direct workers and those who influence the nature of the school system as an organization. A model of an effective learning process is advanced. The Michigan Region COPED (Cooperative Project for Educational Development) strategy is outlined in some detail as exemplary of an effective approach to planned change in education.

Kelly, J.A. 1968. The study of conflict: an approach to theory and research in the politics of educational administration. Paper presented at the Annual Meeting of the American Educational Research Association, Chicago, February 7-10.

Conflict in educational administration is discussed in terms of the characteristics of research on conflict in other areas. The literature on conflict is characterized by a tendency to overgeneralize, a lack of operational explicitness, the drawing of conclusions from limited samples and the dealing with only a few variables. Jung _et al_. discuss several important but neglected factors in the examination of conflict.

Klein, D. 1967. Some notes on the dynamics of resistance to change: the defender role. In Watson, G. (ed.), _Concepts for social change_. Washington, D.C.: National Training Laboratories, National Education Association. pp. 26-36.

The defender against change may be beneficial in pointing out the costs and flaws of a proposed innovation. Ignoring the defender often transforms a change attempt into a conflict situation. An important aspect of the superintendent's job is to create conditions wherein change agents and defenders can interact with minimal tension and maximal respect. Administrators are in a position to be either change agents or defenders.

LeFevre, Carol. 1967. Teacher characteristics and careers. *Review of Educational Research. Educational Organization, Administration and Finance*, 36. pp. 433-447.

A good review of the literature (mostly empirical studies) on the characteristics of the teacher is given. The research is discussed in terms of attitudes towards teaching, predicting teaching success, personality characteristics, teacher image, teacher perceptions and teacher-administration interactions. The application of the methods and findings of clinical and perceptual psychology have greater promise than the static concepts of teacher traits and teacher opinions. LeFevre also cites the neglect of studying psychological factors which affect the teacher's role.

Lehman, C.F. 1966. The physical plant. In Rossi, P.H. and Biddle, B.J. (eds.), *The new media and education*. Chicago: Aldine Publishing Company. pp. 243-260.

Technological innovation requires systemic and systematic adjustments even in the physical environment. The extensive introduction of media is seen as restricting the use of available room space in schools and, at the same time, as possibly electronically tying in remote areas of the school.

Lewin, K. and Grabbe, P. 1945. Principles of re-education. In Bennis, W.G., Benne, R.D. and Chin,R. (eds.), *The planning of change*. New York: Holt, Rinehart & Winston, 1962. pp. 503-509.

This theoretical article offers guides for the process of individual re-educaiton. Exemplary implications for the study of innovation include the following: mere possession of correct knowledge may not suffice to correct false impressions; re-education aimed at the official or verbalized level will often be ineffective; and participation in the process of change enhances change.

Lin, N.; Leu, D.J.; Rogers, E.M. and Schwartz, D.F. 1966. _The diffusion of an innovation in three Michigan high schools: institution building through change._ Institute for International Studies in Education, and the Department of Communication, Michigan State University.

A paradigm of innovation decisions in formal organizations is outlined. Its basic dimensions are the functional unit of adoption, the decision-making unit and the type of innovation-decision. In the investigation of Lin _et al_., teachers predisposed to accepting innovation were found to be younger, tended to think students would benefit from the innovation, perceived their principal as accepting change easily, were relatively satisfied with their job, and thought they have a meaningful part in decision-making.

Lindman, E.L. 1965. Some observations concerning the problem of change in American education. Paper presented at the Institute of Government and Public Affairs Conference on Educational Innovations, U.C.L.A. Lake Arrowhead Conference Denter, December 17-20.

The lack of evaluation of innovations retards their acceptance. Assessment, however, is problematical because of the methodological difficulties in the control of variables in the educational milieu and the polemic nature of the aims of education. Cost, the presence of a complex legal hierarchy, faculty tenure and the precarious motivation of teachers to innovate are other factors that impede educational change.

Lippitt, R. 1967. The use of social research to improve social practice. In Watson, G. (ed.), *Concepts for social change*. Washington, D.C.: National Training Laboratories, National Education Association. pp. 71-81.

Various general research utilization models are discussed. From a comparative study of the utilization process, Lippitt concludes that social research utilization is relatively problematical because social change requires a modification of values, attitudes and skills. Utilization of social research is further characterized by a lack of adequate validation, an absence of feedback about innovative efforts, lack of competition, etc.

Lippitt, R. and colleagues. 1967. The teacher as innovator, seeker, and sharer of new practices. In Miller, R.I. (ed.), *Perspectives on educational change*. New York: Appleton-Century-Crofts. pp. 307-325.

Lippitt *et al*. report the findings of a project on teacher-related aspects of the diffusion of quality teaching practices. Change in education was found to involve the formation of new social interaction patterns and not simply the absorbtion of information. A rather comprehensive list of factors, suggested by teachers as facilitating diffusion of teaching practices is given. The relevant factors are analyzed according to the characteristics of the practice, the physical and temporal arrangements, peer and authority relations, and personal attitudes. The authors' strategy for stimulating innovation-diffusion is outlined.

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McCusker, H.F. and Sorensen, P.H. 1967. The economics of education. In Rossi, P.H. and Biddle, B.J. (eds.), *The new media and education*. Chicago: Aldine Publishing Company. pp. 178-206.

Education is beset by a dilemma of trying to provide quality instruction at the least possible cost. The economic nature of the educational system is labor intensive, with a low degree of specialization and a low level of research-development activity. The effects of the new media on educational practices have been superficial and selective. Obstacles to change are cited. Using a systems-approach decision model, McCusker and Sorensen suggest that the optimal cost-benefit arrangement lies in the allocation of more funds for acquiring and maintaining instructional materials and instructional technology, and the providing for specialized structural assistance.

MacKeachie, W.J. 1966. Higher education. In Rossi, P.J. and Biddle, B.J. (eds.), *The new media and education*. Chicago: Aldine Publishing Company. pp. 260-300.

The research on the teaching effectiveness and the attitudes toward the new media is reviewed. The discussion is analyzed in terms of the differences in impact in college and in the elementary and high schools, the research findings of various universities, uses of the media, and the attitudes of students and faculty. MacKeachie predicts that technological change will bring increased tension in the school, a spiraling decline in the quality of instruction and an increase in hierarchical control.

McKean, R.N. 1965. Centralization and higher education. Paper presented at the Institute of Government and Public Affairs Conference on Educational Innovations, U.C.L.A. Lake Arrowhead Conference Center, November 1.

A variety of pressures for centralization in education stem from legislative designs for expanding state systems, from bureaucratic convenience, from the citizens' beliefs that there is economy in size and that the best solution should be universally applied. McKean concludes from a study of two state college systems that smaller independent institutions, collectively, provide for diversity. Though the costs of centralization may seem trivial, the cost-benefits will alter drastically as the organizational trend perpetuates.

Macomber, F.G. and Siegel, L. 1960. _Final report of the experimental study in instructional procedures_. Oxford, Ohio: Miami University.

With few exceptions, group ITV instruction was found to be as effective as small group or conventional instruction. A progressing disenchantment with ITV by the students was noted initially though such attitudes declined with time. There was a correlation between assistant instructors' attitudes toward ITV and that of the student. Anecdotal evidence indicated that the faculty felt that ITV would aversely affect their status and role, alter course content and possibly produce technological unemployment. The authors made several general and specific observations and recommendations regarding the audio-visual program at Miami University.

Mann, F.C. 1957. Studying and creating change. In Bennis, W.G.; Benne, K.D. and Chin, R. (eds.), The planning of change. New York: Holt, Rinehart & Winston, 1962. pp. 605-615.

The methods of classroom human relations training and organization feedback as effective means of inducing organizational change are compared. Several implications of the analysis are made in the form of recommendations for implementing change.

Marsh, P.E. 1964. Wellsprings of strategy: considerations affecting innovations by the PSSC. In Miles, M.B. (ed.), Innovation in education. New York: Bureau of Publications, Teachers College, Columbia University. pp. 249-267.

The history and development of the innovations of the Physical Science Study Committee (PSSC) are reviewed. The Committee's strategy was somewhat planned, using a material-centered approaches, concurrent activity and a research-development orientation. In retrospect, Marsh notes that the innovations involved unexpected systemic complexity as well as the need for a large-scale coordinated effort. Ultimately, it was the classroom physics teacher who made the PSSC curricular program viable.

May, M.A. 1966. The role of student response in learning from the new educational media. Final report project No. 5-099. Washington, D.C.: United States Office of Education.

Several conclusions are drawn from May's investigation and literature review. The effectiveness of overt responding on learning was found to be a function of the manner in which materials are learned and presented. ITV instructional films were most effective when programmed in the three stages of observation, recitation or testing, and confirmation. There is no one response mode that is optimal for all tasks or for all media or for all students. Other observations, findings and research suggestions are given.

May, M.A. 1965. *Enhancements and simplifications of motivational and stimulus variables in audio-visual instructional materials*: a working paper. Project No. 5-0999. Washington, D.C.: United States Office of Education.

A description and evaluation of the literature on the enhancement and simplification of motivational and stimulus variables in audio-visual instructional materials are given. The discussion is broken down into the topics of motivators (e.g., attention gaining devices, feedback), reinforces (e.g., liking), cue-identifiers and emphasizers (e.g., visual pointers, color cues), and simplifications (e.g., repetition, introduction). Several suggestions for further research are made.

Miles, M.B. 1967. Some properties of schools as social systems. In Watson, G. (ed.), *Changing school systems*. Washington, D.C.: National Training Laboratories, National Education Association. pp. 1-29.

This analytic and comprehensive article is among the best on the school system. Five features of the school are cited: its child-changing emphasis, the belief in local control, the relative isolation from horizontal socializing agencies, the compulsory attendance and explicit or implicit linkages to the larger social context. The genotypical properties and symptoms of the difficulties of contemporary schools are discussed in terms of goal specifications, task accomplishment mechanisms, internal integration and school-community adaptation problems. The implications of the discussion are dealt with under the topics of entry problems, target groups, change goals, change strategies and needed social inventions.

Miles, M.B. 1966. Planned change and organizational health: figure and ground. In Carlson, R.O. and Goldhammer, K. (eds.), Change processes in the public schools. Eugene, Oregon: The Center for the Advanced Study of Educational Administration, University of Oregon. pp. 11-34.

The state of health of an organization can reveal much about the probable success of an innovative effort. Miles discusses the dimensions of organizational health: goal focus, communication adequacy, optimal power equalization, resource utilization, cohesiveness, morale, innovativeness, autonomy, adaptation, and problem-solving adequacy. Educational organizations are uniquely characterized as goal ambiguous, input variable, role-performance invisible, non-interdependent vulnerable, with low technological investment and lay-professional control problems. Several principles and approaches for improving organizational health are outlined.

Miles, M.B. 1964. Educational innovation: the nature of the problem. In Miles, M.B. (ed.), Innovation in education. New York: Bureau of Publications, Teachers College, Columbia University. pp. 1-49.

The thesis for the book Innovation in education is presented in this introductory chapter: attention to the change process can benefit innovational endeavor. Causative factors of educational innovation are mentioned. Innovation in education is dealt with in terms of the traits of the social system context. A typology of change strategies is given. The educational system is analyzed in some detail, with attention given to its various subsystems. Several important issues related to innovation are noted, such as the unique character of education and prior states of the target system.

Miles, M.B. 1964a. Innovation in education: some generalizations. In Miles, M.B. (ed.), Innovation in education. New York: Bureau of Publications, Teachers College, Columbia University. pp. 631-662.

Miles provides the single most comprehensive and well-organized summary of the findings and views on the various aspects of innovation in education. The presentation is analyzed in terms of the following headings: context of educational systems, the innovation itself, the innovative person or group, the prior states of relevant systems, the planning and execution of change processes and the fate of innovations.

Miles, M.B. and Lake, D.G. 1967. Self-renewal in school systems: a strategy for planned change. In Watson, G. (ed.), Concepts for planned change. Washington, D.C.: National Training Laboratories, National Education Association. pp. 81-88.

The New York Region strategy of COPED (Cooperative Project for Educational Development) is presented as a recommended prototype for planned innovation. The strategy regards the school as a socio-technical system and aims at organizational self-renewal. The plan is based on self-study, motivated change, a problem-solving orientation, collaboration, change-supportive climate and change-supported structures.

Miller, R.I. 1967. An overview of educational change. In Miller, R.I. (ed.), Perspectives on educational change. New York: Appleton-Century-Crofts. pp. 1-20.

Miller discusses the general cultural values that foster change. Outside pressures on the profession, and advances in the social and behavioral sciences generate educational change. Several educational factors are mentioned that hinder change: administrative reticence, educational bureaucracy, insufficient finances, the rut of experience, community indifference and resistance, inadequate knowledge of change processes and inadequate teacher education programs.

Miller, R.I. 1967a. Some observations and suggestions. In Miller, R.I. (ed.), Perspectives on educational change. New York: Appleton-Century-Crofts. pp. 359-386.

In this final chapter of Perspectives on educational change, Miller discusses reoccurring themes and makes additional points. The school administrator is critical in change, but unless the teacher cooperates the innovative effort will fail. Communication difficulties and the need for systemic and planned communication in innovation is cited. Educational change agents could be developed through college curricula, pre- and in-service training and state-wide programs. Miller recommends that the consequences and not just the antecedent correlates of innovation be studied. A research inventory of attitudes and perceptions toward change is presented.

Morison, E.E. 1950. A case study of innovation. In Bennis, W.B.; Benne, K.D. and Chin, R. (eds.), The planning of change. New York: Holt, Rinehart & Winston, 1962. pp. 592-602.

The history of the continuous aim-firing gun in the U.S. Navy is reviewed in order to suggest some generalizations about how the innovative process works. Accordingly, resistances confronted by the innovator included honest disbelief in the dramatic though substantiated claims of the innovation, as well as the protection of existing practices and equipment by those who identified with the group which developed these practices. Only a superior staff member overcame these obstacles.

Nasatir, D. 1965. Resistance to innovation in American education. Paper presented at the Institute of Government and Public Affairs Conference on Educational Innovations, U.C.L.A. Lake Arrowhead Conference Center, December 17-20.

Change originating from within the educational setting is not likely, argues Nasatir. Considering innovation in cost-benefit terms fails to weigh the non-quantitative socialization aspects of education. The trend of examining a very large set of systemic variables in innovation limits the prospects for a ready concensus. Innovations which do not provide alternatives for displaced functions will likely meet with resistance.

Pellegrin, R.J. 1966. An analysis of sources and processes of innovation in education. Paper presented at Conference on Educational Change, Allerton Park, Illinois, February 28.

The innovation role of the classroom teacher, administrator, school board, the lay public, state departments of education, colleges and universities, professional associations, federal agencies, textbook publishers, scientists, specialists and other experts are discussed. The sources of innovation lie primarily outside the local community and most often outside the educational profession. The superintendent is largely responsible for the introduction of change in the local community. Several generalizations from a study of change at the societal and organizational levels are given. The educational setting with regard to innovation is discussed and recommendations for improvement are elaborated.

Pellegrin, R.J. 1966a. The place of research in planned change. In Carlson, R.O. and Goldhammer, K. (eds.), Change processes in the public schools. Eugene, Oregon: The Center for the Advanced Study of Educational Administration, University of Oregon. pp. 65-75.

When there is an absence of reliable knowledge, practices and policies in education will be rationalized by a reliance upon authority and tradition. Pellegrin believes that we need to develop a respect for scientific research in education and to train researchers to disseminate their findings.

Pellegrin, R.J. 1965. Community power structure and educational decision-making in the local community. Paper presented at National Convention of the American Association of School Administrators, Atlantic City, N.J. February 15.

Pellegrin's recent investigation reveals that influentials in education are not influential in economic or governmental affairs. The most influential persons in education include administrative officers, especially the superintendent, his aides, and occasionally the principal, and former school board members. The board and public rarely initiate proposals for change. Rather, they weigh administrative plans for change.

Rogers, E.M. 1966. What are innovators like? In Carlson, R.O. and Goldhammer, K. (eds.), *Change processes in the public schools*. Eugene, Oregon: The Center for the Advanced Study of Educational Administration. pp. 55-67.

An innovator is defined as a person among the first 2½% of a given population to adopt a new idea. This article is basically a recapitulation of Rogers (1964).

Rogers, E.M. 1963. What are innovators like? *Theory into practice*, 2. pp. 252-256.

Drawing from research on the diffusion of innovation, Rogers characterizes the innovator as generally young and cosmopolitan, as having high status in terms of education, prestige ratings and income, as having impersonal and cosmopolitan sources of information, and as likely viewed as deviant by peers and by himself. Several implications for school administrators are discussed.

Siegel, L. and Siegel, Lila C. 1966. The instructional gestalt in televised university courses. Title VII Project No. 609. Oxford, Ohio: Miami University.

The instructional gestalt is conceptualized as the interactional setting between learner characteristics (motivation, academic ability, educational set), instructor actions (kind of exam and contact) and features of the learning environment (amount and type of supervision). Considering what is optimal in the learning situation for a particular student is more appropriate than to think in terms of what might be best for all students. The results of the study are treated with respect to the effects and interactions of "instructional press" and "idiosyncratic drive patterns."

Stuit, D.B. and Becker, S.L. 1957. Teaching on closed-circuit television. _Journal of Higher Education_, 28. pp. 339-343.

The findings of the study of the attitudes of college teachers toward closed-circuit ITV at the State University of Iowa is reported. About 80% of the faculty studied did not believe that students could learn as much from televised instruction as from conventional methods. Half the teachers, however, were willing to try ITV. Several other results are discussed.

Trow, M. 1966. The new media in the evolution of American education. In Rossi, P.M. and Biddle, B.J. (eds.), _The new media and education_. Chicago: Aldine Publishing Co. pp. 324-349.

The evolution of new instructional media is discussed. The impact of innovative instruction is conditioned by the indeterminacy of the teachers' product, the low visibility of

teachers' process, and the limited control of the teacher over his own work process. The new media make product definition more visible and remove it from the domain of a teacher. Trow sees the new media as reinforcing centralization, standardization, and lowering the status of the teacher.

Trump, J.L. 1967. Influencing change at the secondary level. In Miller, R.I. (ed.) Perspectives on educational change. New York: Appleton-Century-Crofts. pp. 54-75.

Three characteristics of the school are mentioned as impeding change: togetherness (the pervasiveness of group activity), terminableness (lack of curricular continuity) and tightness (or rigidity). Change is problematic because of various factors such as the weight of tradition, the belief that innovations are passing fads, and the lack of time for innovative endeavor. Several aspects of effective change are discussed including realizing the broad implications of change, re-educating teachers, refining evaluation, remedying shortcomings and planning for financial feasibility. A strategy for initiating change is offered.

Watson, G. 1967. Resistance to change. In Watson, G. (ed.), Concepts for social change. Washington, D.C.: National Training Laboratories, National Education Association. pp. 10-25.

Resistances within the personality and social systems are outlined. Several recommendations are also offered in the form of working generalizations about reducing resistance. The suggestions are discussed in terms of the origin, support, kind, procedures and climate of change.

Wayland, S.R. 1963. Structural features of American education as basic factors in innovation. In Miles, M.B. (ed.), Innovation in education. New York: Bureau of Publications, Teachers College, Columbia University. pp. 587-615.

A national system of education, though not organizationally formal, is evidenced by the national recruitment of teachers, the horizontal mobility of teachers, the national market of instructional materials and the national examination systems. Informal inter-subsystemic linkages are generated between the levels of the educational system. Factors of integration include the interpenetration of staff, accreditation associations, and the demands and admission requirements of higher education. Innovation endeavors should consider both the formal and the informal organizational components of education. The teacher's role as an innovator is hampered because he is actually a functionary in a bureaucracy. The innovative advantage belongs to higher hierarchical members.

Wigren, H.E. 1967. The process of change in educational television. In Miller, R.I. (ed.), *Perspectives on educational change*. New York: Appleton-Century-Crofts. pp. 148-184.

In overviewing the history of ETV, Wigren concludes that the taxpayer's conception of ETV as a partial solution to the growing complexity of educational problems was instrumental in the development of ETV. Other facilitating influences were the financial and organizational support from foundations and government agencies. Superintendents were prime implementers, while local commercial stations played supportive roles. Furthermore, ETV became a community status symbol. Factors that retard the further development and use of ETV include the bypassing of lower levels of professional leadership, competition among media, and the debate about curriculum control.

Guidelines for introducing ETV are offered.

Zander, A. 1950. Resistance to change - its analysis and prevention. In Bennis, W.G.; Benne, K.D. and Chin, R. (eds.), The planning of change. New York: Holt, Rinehart & Winston, 1962. pp. 543-548.

The symptoms of resistance are many, including sloppy effort, overt or covert hostility, a low level of aspiration and clique formation. Resistance may be expected when the nature of the change is not made clear to those affected, when the change is implemented through personal rather than impersonal requirements, and when established patterns are ignored. Several means of minimizing resistance are suggested such as participant decision-making, maintaining reciprocal communication channels, and having the changees gather data which would indicate the need for change. For an interesting comparison, see Buchanan's (1967) discussion on organizational development.